# Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

DECEMBER, 1939

# TELSMITH *INTERCONE*

EXTREMELY LOW PRICE
LARGE CAPACITY
WIDE RANGE OF FINE SIZES
STRONG STEEL STRUCTURE
LEAD-BRONZE ECCENTRIC SLEEVES

HIGH-GRADE ALLOY STEEL PARTS
FORCE-FEED LUBRICATION
PROTECTION AGAINST TRAMP IRON

## ...the latest REDUCTION CRUSHER in the low price field

*WRITE TODAY FOR LITERATURE*

**PRODUCES ⅜ TO ½ INCH ROCK AT AN AMAZINGLY LOW OPERATING COST**

The latest Telsmith development—*the Intercone Crusher* embodies every modern feature of design. But it is not a "new" crusher—25 Intercone Crushers now in successful operation—the result of Telsmith's years of specialized crusher building experience and continuous research.

Many prominent quarry operators have collaborated with Telsmith engineers to *prove* its better performance—in their own plants—thereby increasing their production, sales and profits. The Intercone's big capacity, its steady production, its ability to turn out a better, finer product *and its amazingly low operating cost*—all are a matter of actual plant records.

The Intercone sets a new standard of value in secondary crushers. With all its extra quality features, the Telsmith Intercone is *priced with the lowest*. Find out why the *Telsmith Intercone is the best crusher buy of 1940.*

Write today for literature.

IC-1-9

**SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN**

Canadian Vickers, Limited, Montreal — Gordon Russell, Ltd., Vancouver

50 Church St. New York City | 211 W. Wacker Drive Chicago, Ill. | 713 Commercial Trust Bldg. Philadelphia, Pa. | 81 Binney St. Cambridge, Mass. | Brandeis M. & S. Co. Louisville, Ky. | 412 Westinghouse Bldg. Pittsburgh, Pa.

DESIGNED, BUILT AND GUARANTEED BY THE ENGINEERS WHO DEVELOPED—

# Foto Facts

**No. 5**

PUBLISHED BY THE

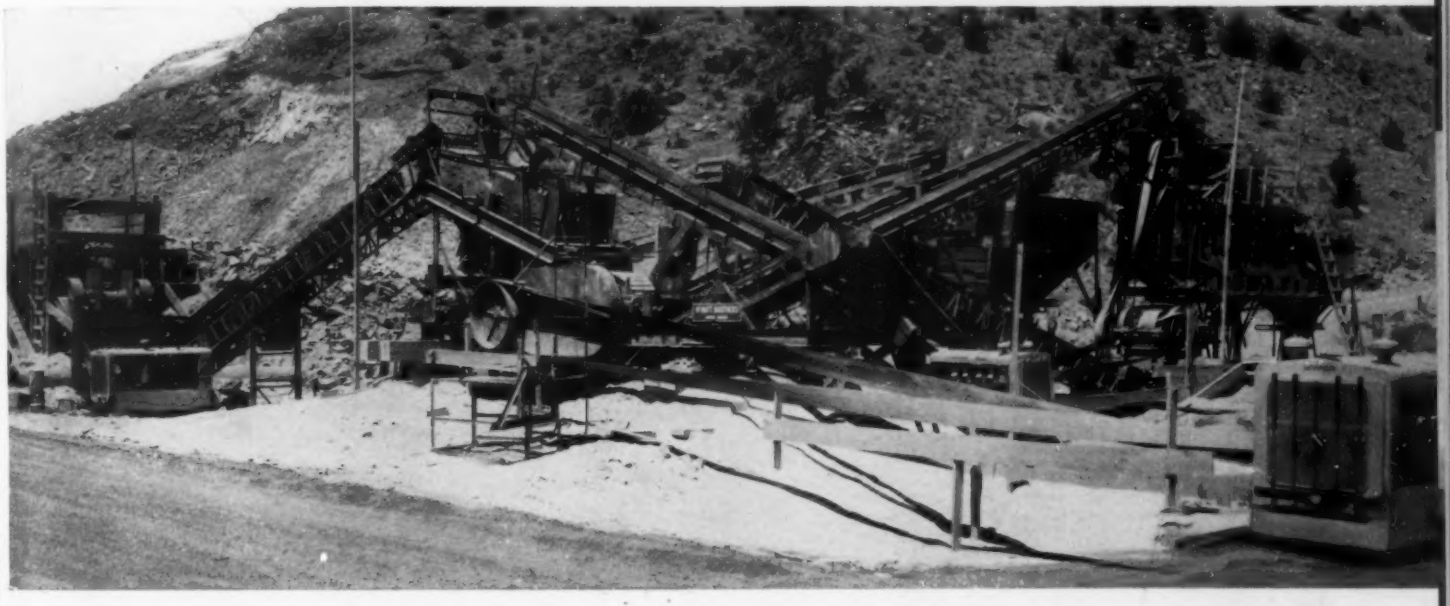
**PIONEER ENGINEERING WORKS**

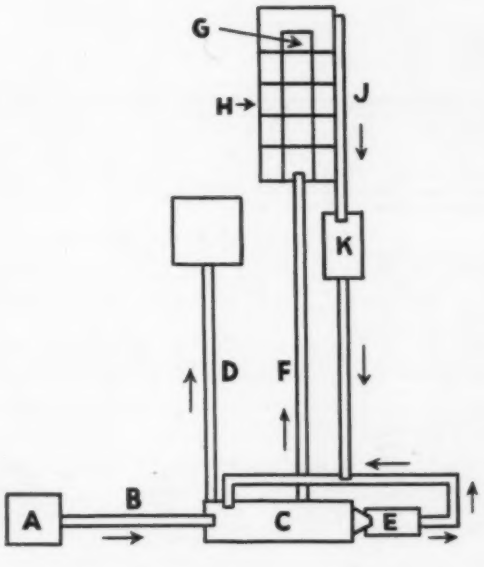
MINNEAPOLIS, MINN., U. S. A.


*McNutt Bros. of Eugene, Oregon, had several problems on their surfacing job at Klammoth Falls . . .*

1. *Produce six sizes.*
2. *Control the quantity of each size.*
3. *Re-crush 1 1/4"—2" to finer sizes.*
4. *Produce 3/4" minus on day shift and four sizes on night shift without changing screens or shutting down the plant.*

## QUARRY PLANT *Controls Quantity of Each Product Size*






To solve their problem, McNutt Bros. selected a Pioneer Plant consisting of the following:

*A.* A 24"x36" Primary Jaw Crusher with anti-slab jaws that takes out the big rocks and breaks them down to about six inches.
*B.* A belt conveyor that feeds the rocks to a
*C.* 4'x12' Vibrator Screen that takes out the minus ¾", the ¾" to 4½", and passes the oversize to E.
*D.* Belt Conveyor for the ¾" minus taken out by Screen
*E.* A 54"x24" Roll Crusher equipped with corrugated shells that crushes everything down to 4½". Belt Conveyor return to screen.
*F.* A belt conveyor delivers the ¾" to 4½" material up to a
*G.* 4'x24' Vibrating Screen which separates five sizes into a
*H.* Five-compartment steel storage bin.
*J.* A return belt conveyor which takes the excess production from any of these compartments and all of the 1¼" to 2" (for which there was no market) to a
*K.* 40"x22" Roll Crusher which crushes them to finer sizes and delivers them back to the screening plant.

When producing ¾" rock on the day shift, it was only necessary to open the gates in bin compartments thereby delivering all sizes to the 40"x22" Roll Crusher which was set to produce ¾".


**PIONEER ENGINEERING WORKS**

**1515 CENTRAL AV., MINNEAPOLIS, MINN., U. S. A.**

### NEXT MONTH'S ISSUE

As in years past, the January, 1940 issue will be the outstanding number of the year. This year it will be particularly valuable to producers in the rock products industries as a reference number throughout the year. New ideas and the latest machinery for processing different products will be portrayed by pictures, drawings, and sketches with explanatory captions and introductory articles. It will be the big idea number in which every branch of the industry will be represented. Colors will be used throughout the issue to make it one of the most attractive ever published. India tinted paper will be used in various sections.

### Cement, Lime and Gypsum

In this special section of the coming pictorial issue, there will be correlated in illustrations all the latest advances in cement, lime and gypsum plants showing new applications of equipment and methods of processing. Pictures and drawings will show unique applications of direct-firing coal mills, dust collection apparatus, grinding mills, conveyors, compressors, transport equipment, power plants, and controls for various equipment. There will be many time and money saving ideas for lime, gypsum, and cement producers.

### Aggregates

Another section will be devoted to crushed stone, slag, and sand and gravel aggregates. This also will be printed on a tinted paper stock, using color with photo and line engravings. The most modern practices in transportation, screening, storing, and grading aggregates will be displayed. Each illustration, with its explanatory caption, will serve to point out a more modern or money-saving method of doing the job.

### Equipment Review

Latest developments of the equipment manufacturer will be displayed in a special section devoted to this purpose. It will in effect be a preview of exhibits which will be shown in St. Louis at the coming conventions of the National Sand and Gravel Association, National Crushed Stone Association, and National Ready Mixed Concrete Association.

### Concrete Products

This section will be enlarged for the January number to include numerous illustrations showing interesting applications of new equipment and methods of handling aggregates and batching. New concrete products and merchandising ideas will be presented.

### Other Departments

In the Chemist Corner there will be published an interesting story about an accurate method and equipment for making a stack dust count. The Lime Forum will describe a modern $CO_2$ plant. Hints and Helps will contain some very practical ideas on various phases of operation in the rock products industry. Don't miss the January installment of Shaw's series on classification, and Nettleton's on crushing, screening, and grading.

# ROCK PRODUCTS

**RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD**

**With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)**

**VOL. 42, No. 12**

## Contents for December, 1939



## Departments



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ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.

Member Audit Bureau of Circulations ← Impartial measurement of reader interest in terms of paid circulation.

Authentic facts relating to editorial scope and readership analysis. → ABP

(PUBLISHED MONTHLY AT CHICAGO, ILL., U. S. A.)

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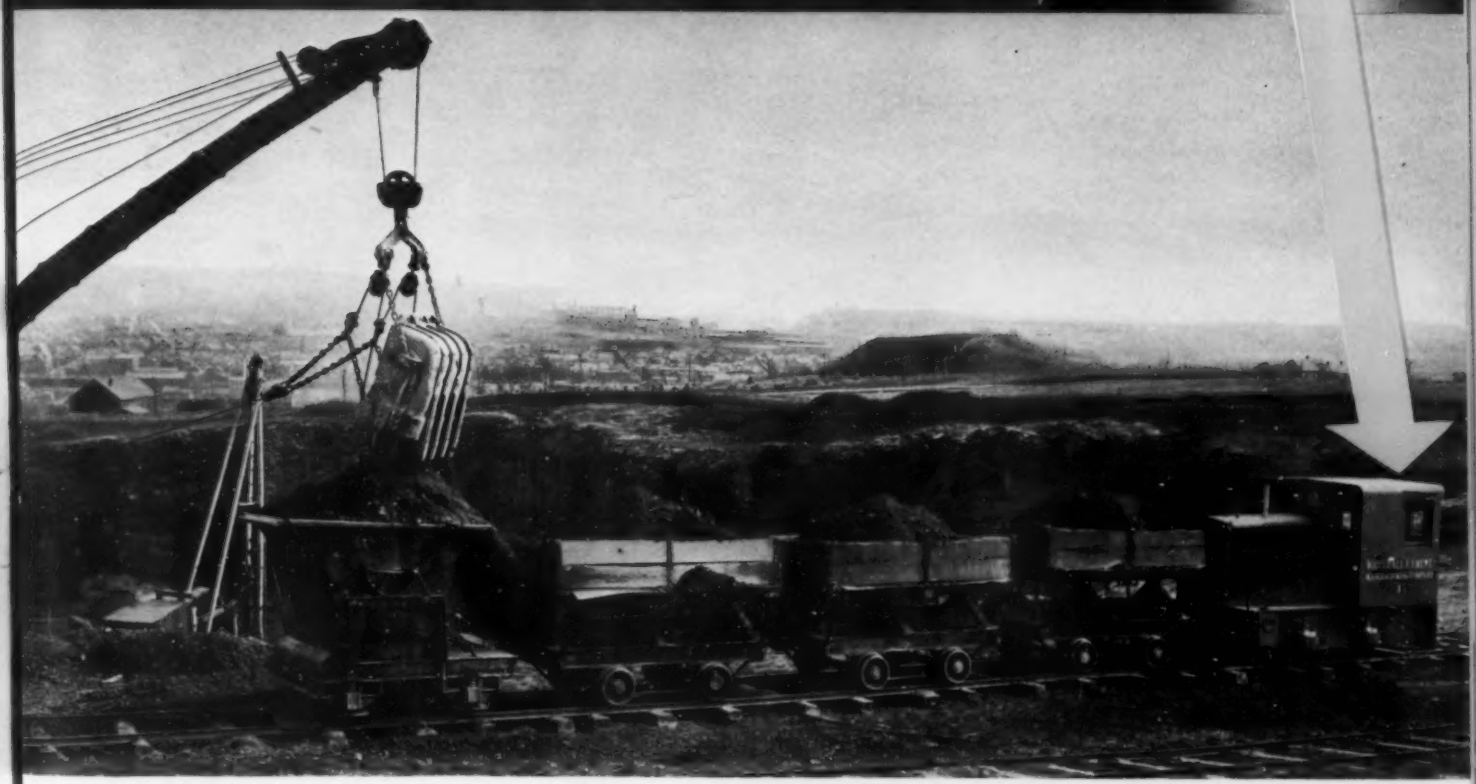
# A GALLON AN HOUR PROVIDES ITS POWER



A single gallon of low-cost fuel per hour is all this "Caterpillar" Diesel-powered Vulcan locomotive requires to shuttle its string of five-ton cars on overburden-removal work for one of America's large cement companies.

Yet, it is only one of many examples of the extremely low-cost power "Caterpillar" Diesel Engines are delivering for the quarrying industries: In locomotives for rail-hauling; in tractors for pushing bulldozers or pulling scrapers and wagons; in machinery for rock-crushing and gravel-screening; in air compressors for drilling; in shovels and draglines for excavating . . . no matter what the application or requirements, these sturdy power-plants are setting up records everywhere for operating economy and dependable going—24 hours a day if necessary, month in and month out.

In behalf of profit increasing, there is so much to be said on the superiorities of "Caterpillar" Diesel Engines that it will pay you to get detailed facts-and-figures at once. See your nearest "Caterpillar" dealer; or write to us direct, giving us a general idea of your power requirements.

**CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS**

**CATERPILLAR**

REG. U.S. PAT. OFF.

**DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY**

# WHERE ORDINARY GREASE *Won't do . . .*


*Left* • **SHOVELS, DRAGLINES, TRACTORS** present lubrication problems that Texaco Marfak will take care of properly. Marfak seals bearings against the effect of rain and mud, and the abrasive action of sand and grit.


*Right* • **TRUCK OPERATORS** get double service from Texaco Marfak for chassis lubrication. It protects parts twice as long. Doesn't separate or wash away.

MANY OPERATORS of heavy equipment know that it pays to service many important grease-lubricated bearings with Texaco Marfak.

Unlike buttery types of lubricants, Texaco Marfak is tough, adhesive, cohesive. It doesn't channel or squeeze out, but clings to bearing surfaces despite heavy pressures.

Texaco Marfak liquefies in the bearing, and retains its consistency at the ends, sealing in the lubricant and excluding dirt and water.

Experienced lubrication engineers, trained in the selection and application of Texaco Industrial Lubricants, will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

For prompt engineering service and deliveries, phone the nearest of our 2279 warehouses in the U. S., or write:

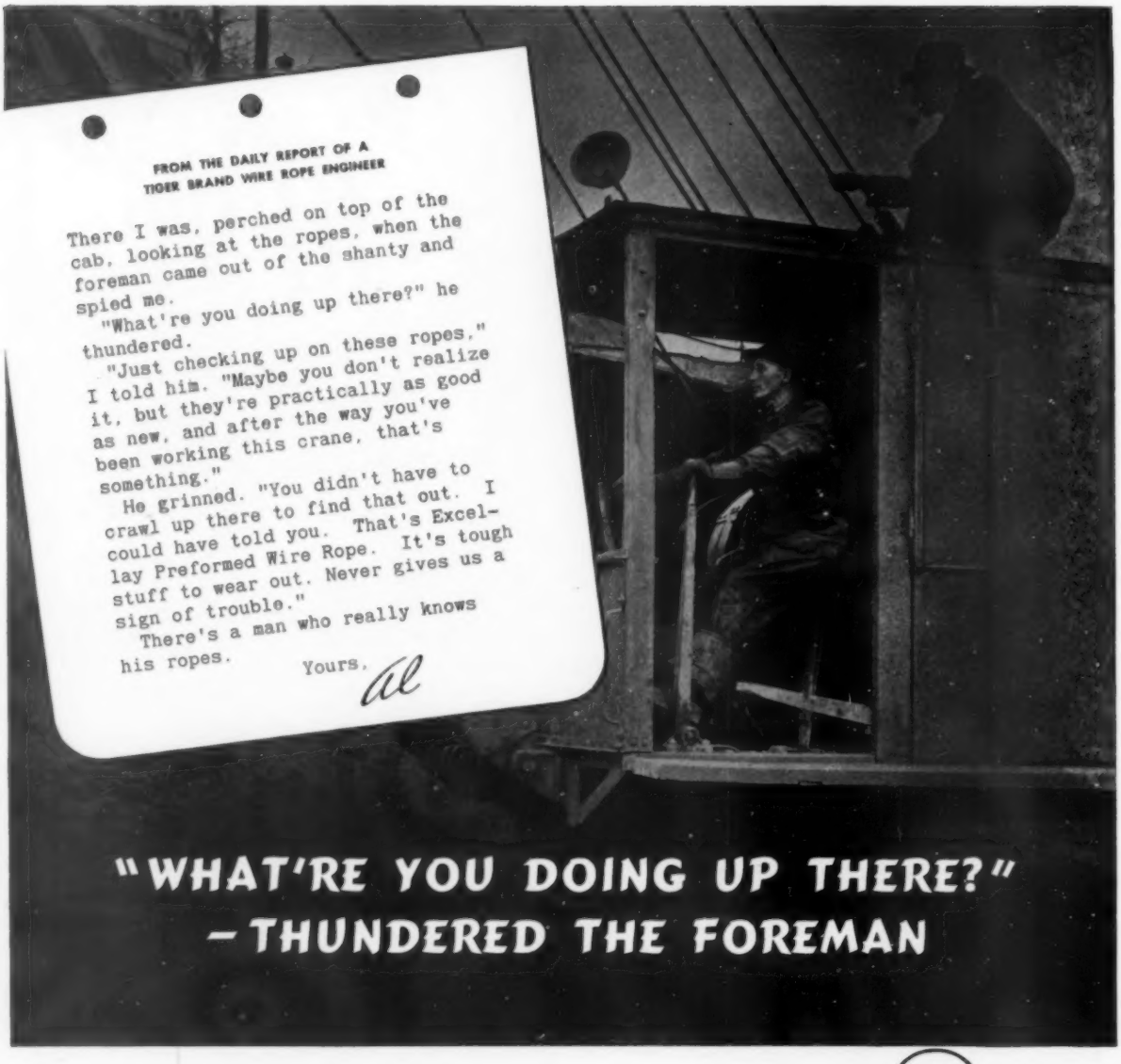
The Texas Company, 135 East 42nd Street, New York, N. Y.

•

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9:00 E.S.T., 8:00 C.S.T., 7:00 M.S.T., 6:00 P.S.T.

TEXACO

# TEXACO MARFAK




# "WHAT'RE YOU DOING UP THERE?" —THUNDERED THE FOREMAN

OUR field engineers are interested in seeing that you get a full dollar's worth of value out of every dollar you invest in wire rope. Most of their time is spent right out where the rope is used. There's no better place to keep in touch with wire rope performance.

That's why these engineers are qualified to give you service that is both helpful and speedy. Besides helping you select the most practical wire rope, they can often give you valuable, money-saving tips on operation. Be sure to take full advantage of their wide experience.

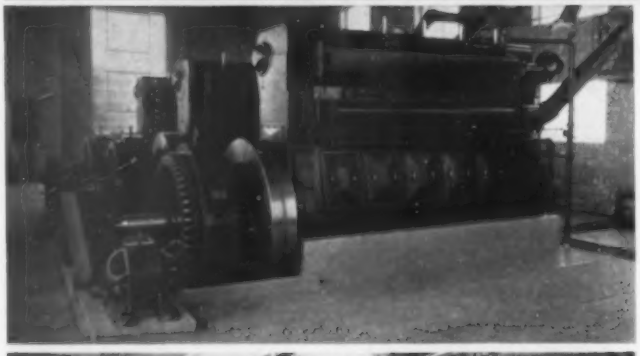
American Tiger Brand Wire Rope is made in all constructions and grades. Our engineers can help you specify the type best suited to your job. Ask one of these men to call.

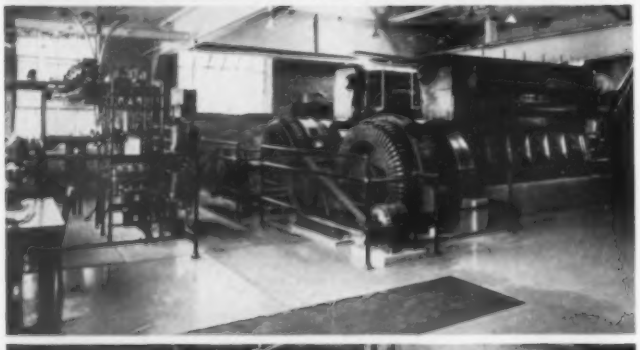
**EXCELLAY** *Preformed* **WIRE ROPE**

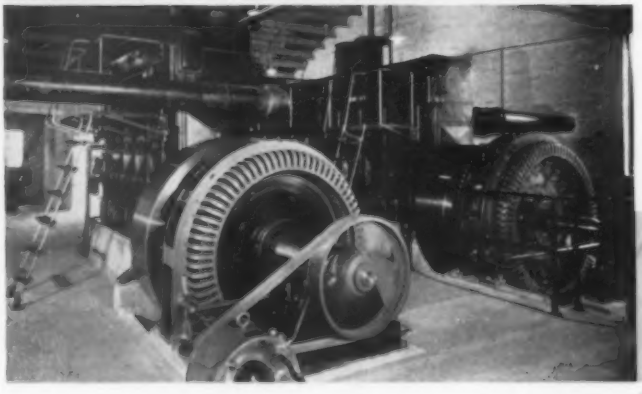
**AMERICAN STEEL & WIRE COMPANY**
Cleveland, Chicago and New York
**COLUMBIA STEEL COMPANY**
San Francisco
United States Steel Products Company, New York, *Export Distributors*

**UNITED STATES STEEL**

# *Lets Go!* TO THE 23rd ANNUAL CONVENTION AND EXPOSITION OF THE NATIONAL CRUSHED STONE ASSOCIATION







SUPERIOR Diesels may be seen in several of the most successful Diesel plants in the stone industry while attending the convention in St. Louis.

Get the first hand experience of the men who have owned and operated Superiors for several years!

The National Supply Company will be there again this year and make special arrangements for you to see its equipment, not on the exposition floor where plenty of fine new equipment will be on display, but right on the job doing the same work you have to do.

Ask our representative about it!
No obligation.

**THE NATIONAL SUPPLY COMPANY**
**SUPERIOR ENGINE DIVISION**
FACTORIES: Springfield, Ohio; Philadelphia, Pa.
SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Jacksonville, Fla.; Houston, Texas.

# For real service on *Wire Rope*

## get in touch with your Bethlehem distributor


YOU'LL find the distributor for Bethlehem Wire Rope is a good man to know and have dealings with. You'll find that he knows his business thoroughly and that he is well able to suggest the best Bethlehem Wire Rope for your particular type of work.

You'll find, too, that your distributor's stock of Bethlehem Wire Rope is large and that he is backed to the limit in keeping it up-to-date by both the Bethlehem district warehouse and by the rope mill itself.

To be sure of prompt, efficient service on wire rope and of getting the grade and type that exactly meets your needs, get to know the nearest distributor for Bethlehem Wire Rope. A letter to Bethlehem Steel Company, Bethlehem, Pa., will bring you his name and address by return mail.

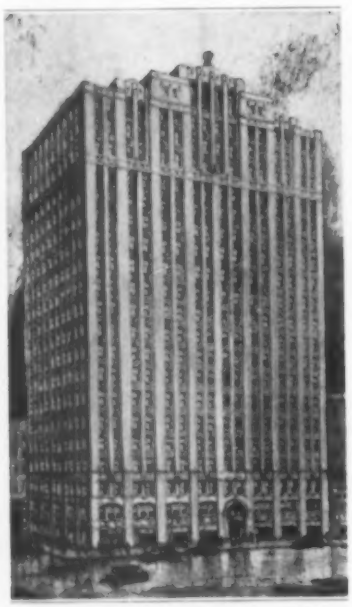
**PURPLE STRAND IS BETHLEHEM'S TOP-QUALITY WIRE ROPE**

**BETHLEHEM STEEL COMPANY**

BETHLEHEM STEEL

*Floor plan of Tradepress Publishing Corporation, publishers of ROCK PRODUCTS*

# *We're Moving December 15!*



## TO THE 19th FLOOR

## 309 WEST JACKSON BLVD.

**You are cordially invited to visit us in our new home at any time. With the larger quarters and improved facilities we are confident we can serve the industry even better. Next time you're in Chicago come on up and see us. We'll be looking for you.**

# ROCK PRODUCTS

***(Until Dec. 15)*** **205 W. Wacker Drive** • ***(After Dec. 15)*** **309 West Jackson Blvd.**

***CHICAGO, ILL.***

# PRIMACORD·BICKFORD DETONATING FUSE for Large and Small Blasting

It is often practicable to use Primacord-Bickford Detonating Fuse in comparatively small blasts, especially in connecting Jackhammer holes. The ease of making each hook-up, and the fact that Primacord is insensitive to ordinary shock, has greatly increased the use of this method in the shooting of shallow holes.

For the giant blast, Primacord offers new advantages: a faster and more powerful detonating wave; lighter weight; easier handling and use; lower costs.

Send for the Primacord booklet. It suggests new ways to better output and profit in blasting.



THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONNECTICUT, U. S. A.

*Makers of Cordeau-Bickford Detonating Fuse and Safety Fuse Since 1836*

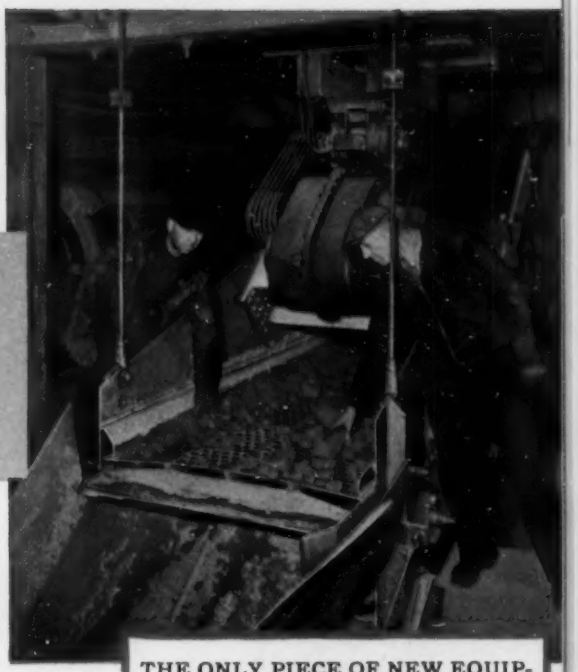
PRIMACORD·BICKFORD *Detonating Fuse*

PB 15

# OPERATING COSTS CUT $17,500 PER YEAR!

*Another true case history from the Allis-Chalmers files that proves* **"IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF!"**

**Koenig Coal & Supply Co. Doubles Output . . . Cuts Costs of Production in Half! Find Out How You Can Save Money by Modernizing with the Allis-Chalmers System . . . with the Equipment that Pays for Itself!**



THE ONLY PIECE OF NEW EQUIPMENT the Koenig Coal & Supply Co. needed to cut the cost of gravel in half was this Allis-Chalmers Low-Head Screen . . . the fastest selling screen on the market today.

When the flow sheet has to be changed to meet today's demand for finer aggregates . . . when large boulders crop up in the gravel bed . . . when power and maintenance costs start to soar . . . that's when a crushing plant needs real engineering skill to keep operating at a profit!

That's what John F. Koenig, president of the Koenig Coal & Supply Co., Detroit, was up against early in 1937. Production was dropping off. Four or five men had to be stationed at the crushers to work large boulders around so that feed could be increased. It looked as if a big investment in new equipment was needed. Then Mr. Koenig called in the Allis-Chalmers engineers!

These engineers licked the problem! They stepped up the plant capacity to 244.6 tons per hour . . . nearly double the former output for the 1200 annual hours of operation. They cut the cost of gravel from 12 cents to 6 cents per ton . . . a total saving of $17,500 for the year 1938!

**Profit by Modernizing!**

And that saving was effected . . . not with new equipment that would have meant thousands of dollars to Allis-Chalmers . . . but largely through modernizing the existing machines! The crushers were set closer, speeded up, and the throw increased. The old rotary screen was replaced with an Allis-Chalmers Low Head Vibrating Screen to insure lower carryover to the crushers.

No wonder the Koenig Coal & Supply Co. recently bought an Allis-Chalmers tractor and scraper. They wanted the great engineering . . . the full measure construction that goes into all Allis-Chalmers equipment!

You'll want to know how Allis-Chalmers 90 years of engineering superiority can go to work for you! Let a trained engineer in the district office near you show you how you can cut operating costs . . . keep production rolling . . . with the equipment that pays for itself!

1086

*Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!*

CRUSHING · CEMENT AND MINING DIVISION

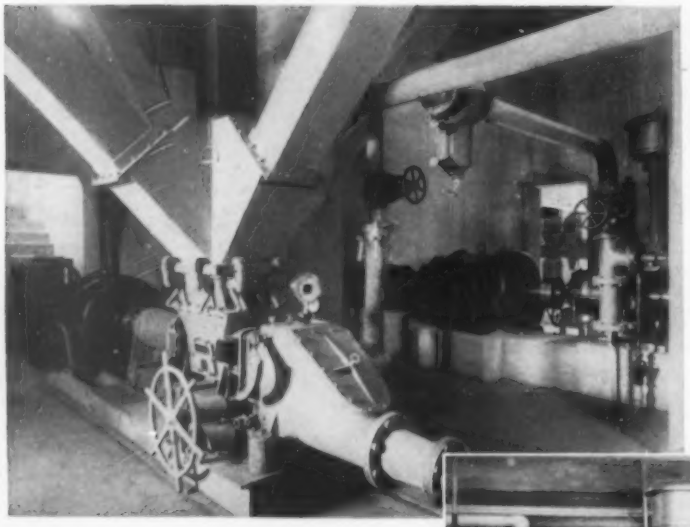
**ALLIS-CHALMERS**

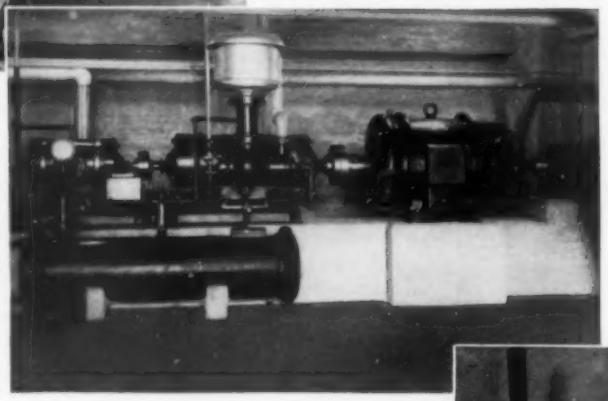
MILWAUKEE · WISCONSIN

# *Another* FULLER-KINYON PUMP

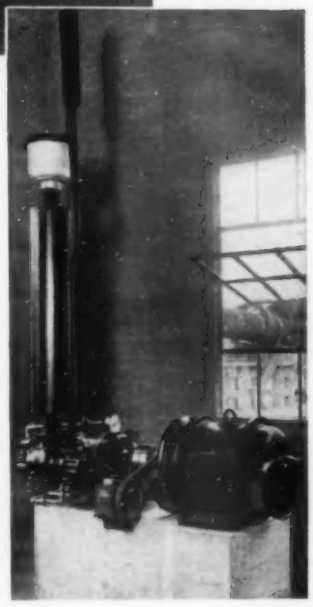
AND

# FULLER ROTARY COMPRESSOR INSTALLATION





Above—Fuller-Kinyon Portable Cement Pump for conveying cement from silos to packer bins. Fuller Rotary Single-stage Compressor in background, furnishing air for Fuller-Kinyon Pump. Right—Fuller Rotary Two-stage Compressor furnishing air for Fluxo Conveying System. Lower right—Fuller Rotary Single-stage Compressor, furnishing air for slurry agitation.



**ANOTHER Fuller installation, thousands of miles away, attesting to the confidence placed in this equipment to give lasting, trouble-free service and continuous performance day in and day out. In this modern, up-to-date cement plant in South America, Fuller equipment was selected and installed, as follows:**

**Two 7" Type H Fuller-Kinyon Portable Pumps; conveying cement from silos to packer bins. Also for recirculating.**

**Two 4" Type H Fuller-Kinyon Stationary Pumps; conveying packer spill to packer bins.**

**One Two-Stage Fuller Rotary Compressor; air for Fluxo Conveying System.**

**One Single-Stage Fuller Rotary Compressor; air for slurry agitation.**

**Two Single-Stage Fuller Rotary Compressors; air for Fuller-Kinyon Pumps.**

**Of course, Fuller-Kinyon Pumps have long been accepted as standard practice in the cement industry; and now, more and more Fuller Rotary Compressors, due to their inherent characteristics and advantages, are being installed in cement and other industrial plants.**

## FULLER COMPANY

**CATASAUQUA, PENNSYLVANIA**

**Chicago: Marquette Bldg.** **San Francisco: Chancery Bldg.**

G-15

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS

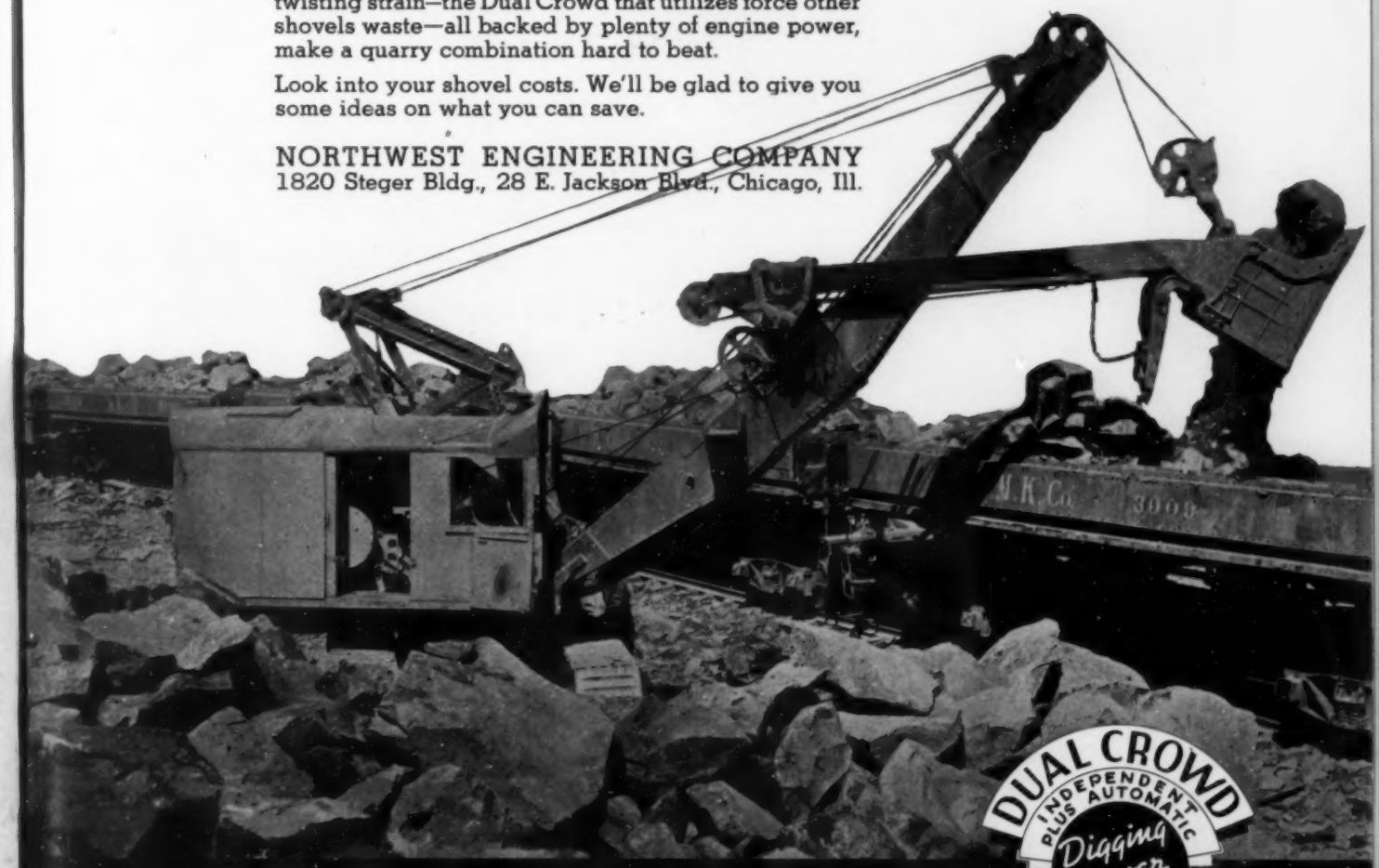
# DO YOU KNOW What your Shovel Costs you?

OR is shovel operation expense buried in pit costs? Bring it out in the light sometime and look it over—particularly if you are still depending on an old steamer. You may be surprised. Water, fireman, ashes, boiler tubes and grates mean money!

There are no standby charges on a gasoline, Diesel or electric shovel. When the engine stops, expense stops, and a modern Northwest machine will easily outdig your old steamer, or a new one for that matter. Northwests are real rock shovels, ruggedly built. A powerful welded boom (and no Northwest Welded Boom has ever failed)—Welded Dipper Sticks tied together at the inner end for greater resistance to twisting strain—the Dual Crowd that utilizes force other shovels waste—all backed by plenty of engine power, make a quarry combination hard to beat.

Look into your shovel costs. We'll be glad to give you some ideas on what you can save.

NORTHWEST ENGINEERING COMPANY
1820 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.

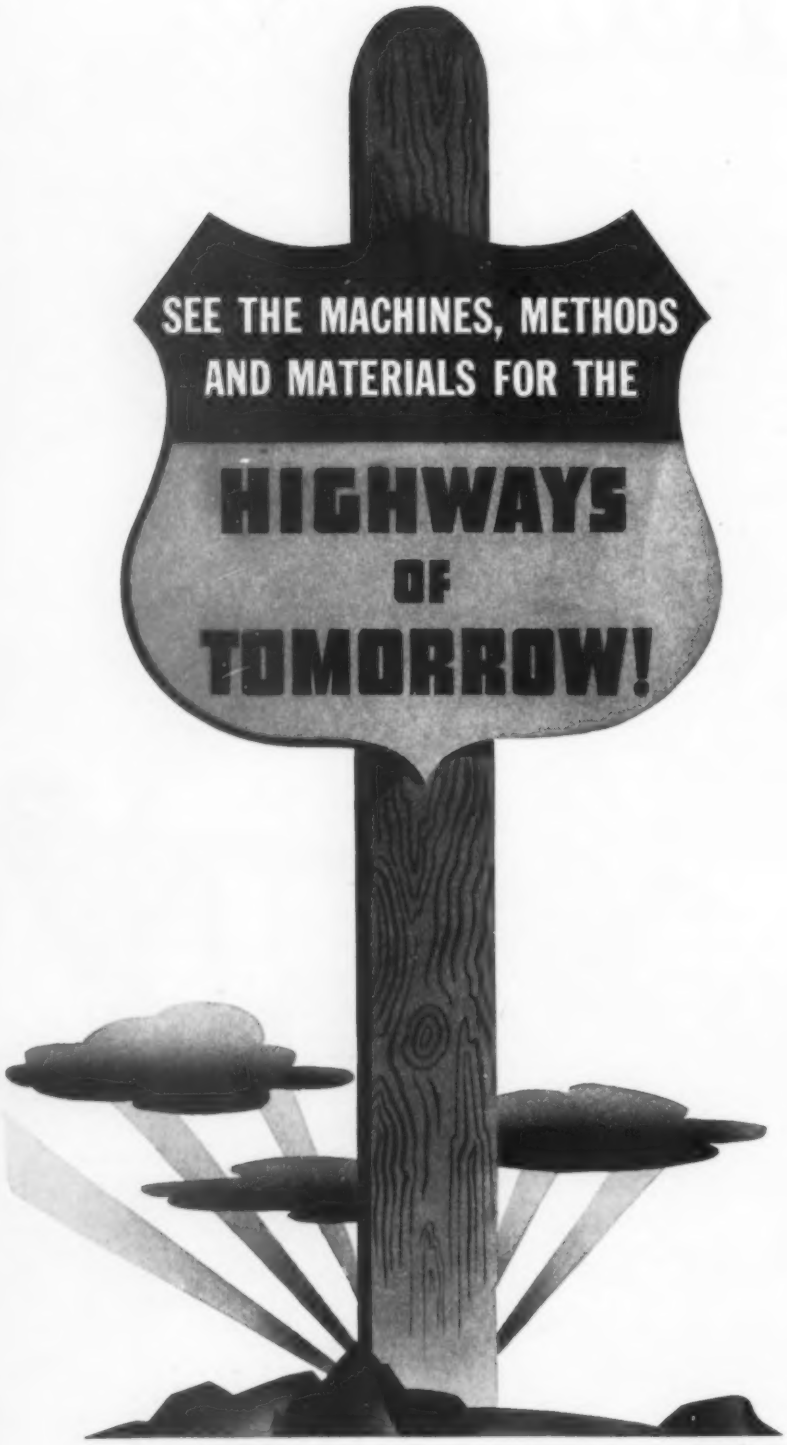


DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

# NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS • SKIMMERS




CONTRACTORS! Engineers! State and County Highway Officials! Here's your chance to see, compare and evaluate for yourself every recent development in the long line of machines, methods and materials you use on your jobs!

That's right, the A. R. B. A. Road Show and Convention is a grand opportunity to get off to the right start in 1940—to get together with the men who know your problems; to talk shop with old friends and make new ones; to get a line on how your business is going to shape up in 1940! Make no mistake—you're giving yourself a break when you plan to attend the 1940 A. R. B. A. Road Show in Chicago on January 29 to February 2.

**COME TO THE 1940 A. R. B. A. ROAD SHOW AND CONVENTION**

***International Amphitheatre • Chicago • January 29 to February 2***

# ROTARY KILN FIRING

## now reduced to the most economical form

RAYMOND Bowl Mills provide a unit system of drying, grinding and direct-firing coal to cement and lime kilns that shows major savings in operating-overhead, power costs and fuel consumption.

In the plant above, two Bowl Mills have replaced a complicated bin-system of fueling cement kilns, and they have proved so satisfactory that another unit will soon be installed for a third kiln.

The new system is entirely dustless and automatic, both mills being controlled by one operator from the panel boards located on the burner floor. Thermostatic controls keep the coal-air mixture at the right temperature for efficient combustion.

**Other advantages include the following:**

**Fineness held uniform within a range of 75% to 80% through 200-mesh.**

**Raw coal dried in mills from average 12% down to 4½% moisture content.**

**Waste heat taken off at kiln hoods and drawn into mills through ducts.**

**Hazards of coal dust eliminated by completely enclosed mill system.**

**Write for Catalog No. 43**

## The Operator

can control and watch the mill operation from the electric panel board, shown opposite, which includes:

Draft Gauge

Inlet and Exit Air Temperature Recorder

Mill Power Ammeter

Watt Hour Meter

Feeder Revolution Counter

Feed Rate Indicator

Starter Push Buttons with Pilot Lights

**Convenient operating control and thermostatic tempering control—plus smooth, quiet, vibrationless operation of the Bowl Mill—bring new efficiency in rotary kiln firing.**

# RAYMOND PULVERIZER DIVISION

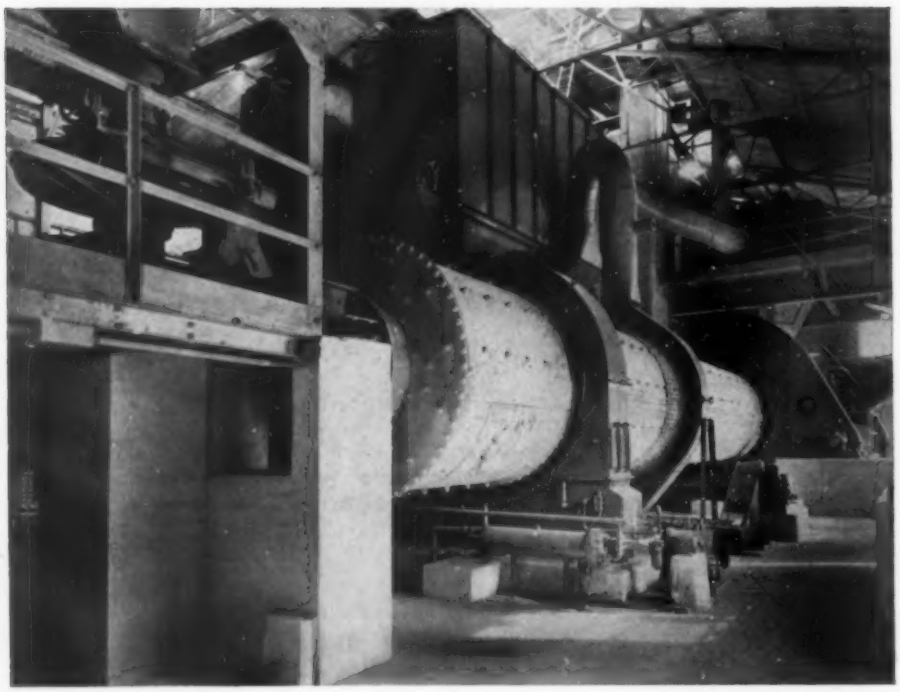
## COMBUSTION ENGINEERING COMPANY, INC.

1307 North Branch Street CHICAGO

Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

# GRINDING MACHINERY

Wet grinding or dry grinding
Open or closed circuit
Gravity discharge or air swept
Combined drying and grinding
Direct firing or bin system



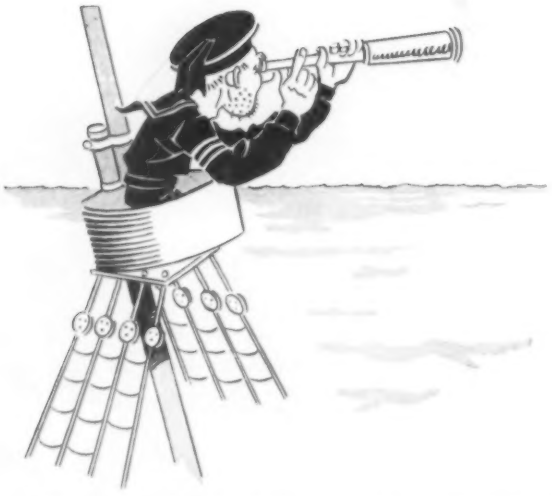
**UNIDAN** multi-compartment mill, combining granulating and pulverizing.
**UNIKOM** multi-compartment mill with overhung preliminary grinding chamber.
**TIRAX** multi-compartment air swept mill for drying, grinding coal, etc.
**ATOX** air swept high speed, vertical shaft mill for drying and grinding.
**KOMINUTER** and **BALLMILL** for granulating. **TUBEMILL** for pulverizing.

Also a complete line of accessories for the grinding operation such as air separators and classifiers, Trix wet separator, fans, liners, grinding bodies, spray casings, symetro gear boxes, feeders, conveyors, pumps, dust casings, washmills, etc.

## F. L. SMIDTH & CO.

225 BROADWAY Engineers NEW YORK, N. Y.


New 1¾ YD.
LORAIN
80
• Test first and talk later was the policy back of the Lorain-80's development. So, without any fanfare or ballyhoo, Lorain-80's went to work in 13 states on such jobs as the Virginia Skyline and the Pennsylvania Turnpike. Over a period of months—not weeks—these machines have had their teeth in every kind of digging—been subjected to every known test their owners could think of to prove their power, speed and strength.
What's the verdict? Just ask the owners of these Lorain-80's. They've got figures and facts galore that bear out our original hunch —Lorain has again produced a "winner."
Write for list of these owners and copy of catalog describing the new features of the 1¾-yd. Lorain-80.
THE THEW SHOVEL COMPANY
LORAIN, OHIO
You'll see a lot of brand new equipment like the Lorain-80 at the Chicago Road show, Jan. 29th to Feb. 2nd. Let's go!
THEW CENTER DRIVE



# WHAT'S

## FOR THE ROCK PRODUCTS INDUSTRY

***Thomas S. Holden, Vice-President, F. W. Dodge Corporation, predicts that 1940 will show substantial increases in the construction industry.***

"*Commercial building:* an increase of 16 percent over 1939.

"*Manufacturing buildings:* an increase of 41 percent.

"*All other non-residential buildings* (principally public and institutional buildings): a decline of 15 percent; hospitals are expected to increase, religious buildings to be built in the same volume as in 1939, and the other classes to decline.

"*Residential building:* A 5 percent increase in private residential building and a 65 percent increase in public residential building, netting a 14 percent increase in all residential building. Large-type residential buildings (apartments and hotels, including both privately and publicly financed) are estimated to increase about 26 percent; one- and two-family houses are estimated to increase about 9 percent. New family dwelling units would increase in about the proportion of total dollar residential volume, 14 percent.

"*Heavy engineering construction* (public works and utilities): the total volume is estimated at practically the same as 1939, net result of moderately increased highway construction, sizeably increased electric utility construction, and declines in all other classes.

**"The net result of an estimated 11½ percent increase in total private construction and a 1 percent increase in public construction would be a 7 percent increase in total construction volume over 1939. As usual, the Dodge Corporation makes these estimates, not in the capacity of an oracle with prophetic powers, but as a reasoned set of guesses which it is hoped will be useful for executives who are responsible for advance planning for their organizations. Increased airplane production and army and navy construction are apt to help the 1940 volume of activity in the Pacific Coast states very considerably; with the possibility of larger construction increases in the far west than in the eastern area."**

# AHEAD IN 1940?

## FOR THE EQUIPMENT MANUFACTURERS

**This year's increase in business for our industry, plus the favorable prospects for the coming year, are incentives enough for plant operators to carry through the modernization plans so many of them have been delaying. We recommend to equipment manufacturers an increased advertising program in ROCK PRODUCTS as the surest, most logical and economical method of securing their full share of these sales.**

**The January 1940 ANNUAL PICTORIAL REVIEW NUMBER will graphically show how new equipment of all kinds is being used to modernize plants so they can keep up with present-day demands. Shrewd advertisers will use this opportunity to portray the advantages of their equipment. The combination of editorial and advertising pages will be an authoritative modernization guide for a full year.**

**Be sure your products are adequately represented. Forms close December 22. There are only a few choice positions still available in the special sepia sections without extra cost so send your reservation promptly.**

# ROCK PRODUCTS

**205 WEST WACKER DRIVE • CHICAGO, ILL.**

# CEMENT MILL CRUSHER MAINTENANCE

## At Only 1/10 of a Cent per Ton



**Santa Cruz Portland Cement Co., Davenport, California.**
*Seven-Foot Symons Standard Cone Crusher installed in 1929.*

| | Sieve | % Retained | % Accumulative | % Passing |
|---|---|---|---|---|
| | .742" | 000 | 000 | 100 |
| | .525" | 10.3 | 10.3 | 89.7 |
| | .371" | 16.6 | 26.9 | 73.1 |
| | .263" | 12.7 | 39.6 | 60.4 |
| −3m | +4 | 8.0 | 47.6 | 52.4 |
| −4 | +6 | 7.5 | 55.1 | 44.9 |
| −6 | +8 | 7.0 | 62.1 | 37.9 |
| −8 | +10 | 6.3 | 68.4 | 31.6 |
| −10 | +14 | 5.0 | 73.4 | 26.6 |
| −14 | +20 | 4.2 | 77.6 | 22.4 |
| −20 | +35 | 8.1 | 85.7 | 14.3 |
| −35 | +48 | 3.1 | 88.8 | 11.2 |
| −48 | +65 | 2.3 | 91.1 | 8.9 |
| −65 | +100 | 1.7 | 92.8 | 7.2 |
| −100 | +200 | 3.0 | 95.8 | 4.2 |
| −200 | | 4.2 | 100.0 | |

## DURING THE YEAR 1938

—this Symons Cone Crusher crushed a total of 350,000 tons of limestone, taking a 6 inch and minus feed and making a product of the accompanying screen analysis. Crushing was at the rate of 250 tons per hour. The repair cost for the year, including labor and material, was $350.00, or only one-tenth of a cent a ton.

This remarkable record for maintenance on raw side crushing was established after ten years of service. Installations in other mills of Symons Cone Crushers on clinker are just as outstanding. In many instances, the low crushing costs of Symons Cones have been a vital factor in reducing operating costs and in increasing profits. Whatever your fine crushing problem, investigate the advantages of Cones.

## NORDBERG MFG. CO. *Milwaukee, Wis.*

**NEW YORK CITY** 60 East 42nd Street
**LOS ANGELES** Subway Term. Bldg.
**TORONTO** Concourse Bldg.
**LONDON** Bush House

# SYMONS CONE CRUSHERS

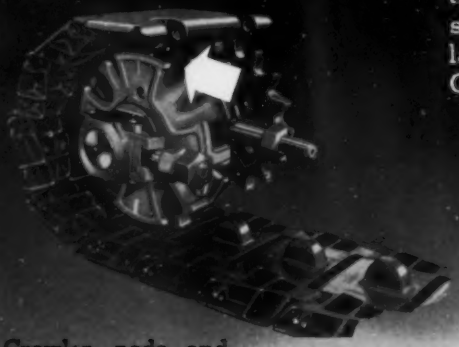
# WHY DO MARION CRAWLERS WIN THE PRAISE OF EVERY MARION OWNER?

Every buyer of a Marion shovel, dragline, crane, clamshell or trench hoe expresses keen enthusiasm over MARION CRAWLERS. They like the way these CRAWLERS travel over uneven ground without locking or binding—how they pull through any material without clogging. They like the idea of using manganese steel for crawler shoes as this reduces the bending and breaking of belts to a minimum. • MARION CRAWLERS are built with tapered open pockets in the driving sprockets to prevent material from packing in and to make them self-cleaning. The double flanged rollers will not collect dirt. Ample clearance between the crawler belts and the bottoms of the side frames provides a dirt shedding action in travel that prevents any delay caused by clogged crawlers. • MARION CRAWLERS should be one of the determining factors in your decision to

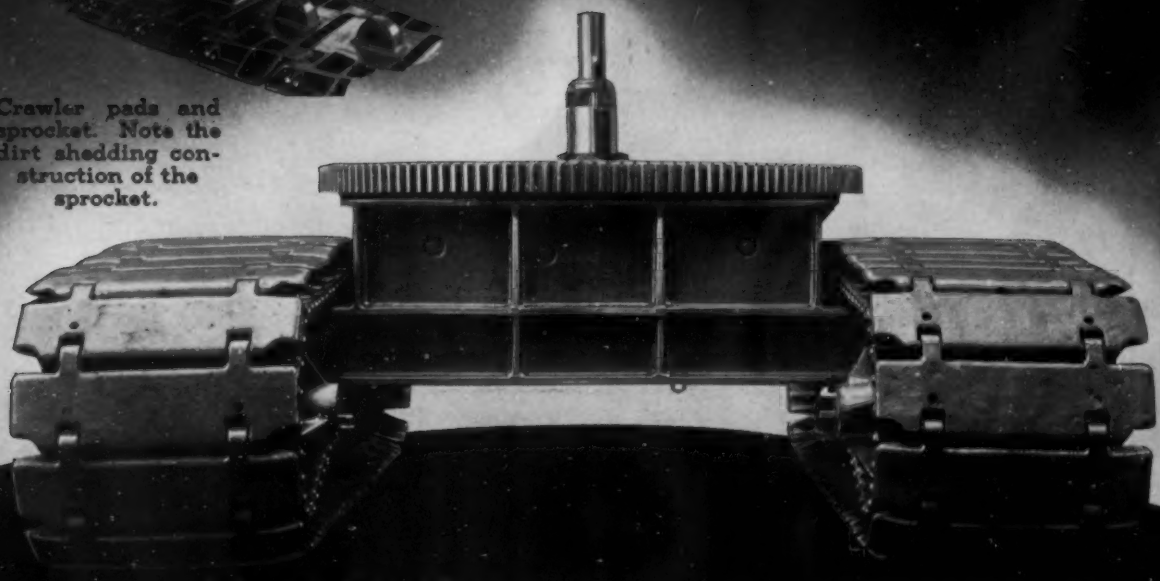
MODERNIZE with MARION

●

## MODERNIZE *with* MARIONS



Crawler pads and sprocket. Note the dirt shedding construction of the sprocket.



## THE MARION STEAM SHOVEL CO.

MARION, OHIO, U. S. A.

**Shovels · Draglines · Cranes · Clamshells · Trench Hoes · Walkers**

# *Study this winter Profit next spring*

**ROBINS MAKES**

Belt Conveyors, Belts, Idlers, Trippers, Bucket Elevators, Vibrating Screens, Screen Cloth, Feeders, Bin Gates and Mead-Morrison Hoists and Grab Buckets.

You know that *now* you can get service, deliveries and prices on material handling equipment. Conditions for 1940 are anybody's guess. One thing is sure, better handling facilities will yield higher profits and now is the time to plan for and order them. Robins engineers are ready to suggest improvements that will pay for themselves by reducing the cost of handling. Telephone or write.

MATERIAL HANDLING ROBINS EQUIPMENT

**ROBINS CONVEYING BELT COMPANY**
**15 Park Row New York, N. Y.**


# QUALIFICATIONS FOR LEADERSHIP

THE DICTATOR type of leadership is unpopular in this country. That applies not only to political leadership and labor leadership, but to leadership in individual industrial and business institutions. It is the natural American reaction to developments elsewhere in this perturbed world.

Would-be dictators are numerous; and to be a petty dictator requires no unusual qualifications; the desire to dictate is probably latent in all of us. A good old friend, now dead, used to say: "There are but two ways of directing an organization, one is by fear and the other by love"; and he would add, "the people whom you can direct and control by love are rare." Longer experience and observation has led to the conclusion, rather, *"the ones who can handle subordinates by love are exceedingly rare."*

What then are the qualifications of leaders, the kind of leaders our future as a democratic nation of free enterprise must have to survive the deluge of communism that most certainly will follow the present war in Europe? We think we have an answer in a news item in *Mining and Metallurgy*, September, 1939, p. 440. This item illustrates and describes a monument to the late general manager of the U. S. Metals Refining Co., Carteret, N. J., unveiled July 12 before the 3000 employes of the company, who voluntarily subscribed the entire cost and did much of the work themselves, without even a suggestion from the management. The man whom they were honoring was Max A. Koeckert.

Here is what the employes put on a bronze plaque: "General manager of this plant from 1931 to October, 1938, and was 'our beloved boss.' He entered the service of this company as a weigher on September 28, 1904 and by virtue of his own industry and ability and wholly without influence from any source he rose through various stages to the highest position in this plant.

"While remaining faithful to the responsibilities of his position he also remained faithful to the interests of his fellow workers. In this he showed the highest type of executive leadership. He was our friend and we were his friends. Our company and we prospered through this relationship.

"This memorial is erected as our tribute to the man we loved and with the hope that it will serve as a perpetual inspiration to those who come after us."

The late general manager's own boss, the president of the company, Heath Steele, had to say (in part): "Max was an outstanding example of truthfulness, honesty, and loyalty—loyal to his company, and, above all, loyal to the interests of his fellow workers. These virtues, coupled with his determination always to do a job well, were responsible for his having risen from the ranks to be your leader. Max never tried to cover up mistakes or troubles. He never looked for an alibi. If he had an opinion different from his superiors, he never failed to state it. His knowledge was based on hard-earned experience; yet he always looked for and was ready to try new ways and methods. It was easy to work with such a man, because one could have implicit faith in everything he said.

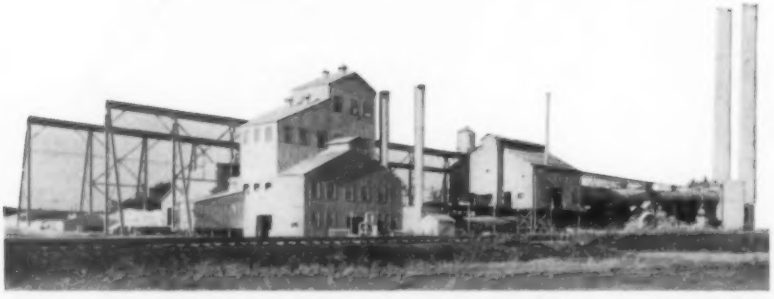
"In these days when some would change our industrial institutions to a system where everything would be regulated by a strict code of laws, it is refreshing and encouraging to read here the sentiments expressed on this tablet by you men, because it shows that you have a clear understanding of the opportunities offered under the present industrial organization to all men who have the desire and ability to improve their positions."

A good many executives pride themselves on being "hard-boiled." A certain amount of hardness, call it firmness, "guts," character, or any other term, is obviously necessary in a world where one survives in business by constant, unremitting competition. If with that hardness goes *fairness*, the man may have the qualifications for leadership. Men who have the responsibility of selecting candidates for executive positions have said that an innate sense of fairness is one of the rarest of human qualities. Fairness requires the ability to see the other fellow's problem as well as our own. It means some degree of unselfishness, that most extolled Christian virtue but the one most rarely practiced in business relationships.

The really significant facts in the instance described are that a manager can be at the same time wholeheartedly loyal to fellow workers and to ownership; and that his value to ownership is appraised in terms of the loyalty of those he bosses. Those facts are often hard to absorb by both owners and workers. It is the difference between a genuine leader and a mere driver.

Nathan C. Rockwood

# Kiln and Mill Controls To Make



General view showing rebuilt clinker mill on left, rotary cooler to condition clinker in center, and rotary kilns to the right

By BROR NORDBERG

DURING TWELVE YEARS' OPERATION, having started with a new modern plant in 1927, Yosemite Portland Cement Co., at Merced, Calif., has made several mill improvements that reflect the importance placed on close control of departmental operations, new finish grinding technique and development of new products to expand markets.

The plant consists briefly of two 10- x 240-ft. gas-fired Allis-Chalmers rotary kilns rated by manufacturer at 1250 bbl. of clinker each, two 7- x 26-ft. Allis-Chalmers two-compartment mills for wet grinding of raw material, using air-agitated slurry tanks and Wilfley slurry pumps for handling the feed material, and two similar mills for clinker grinding.

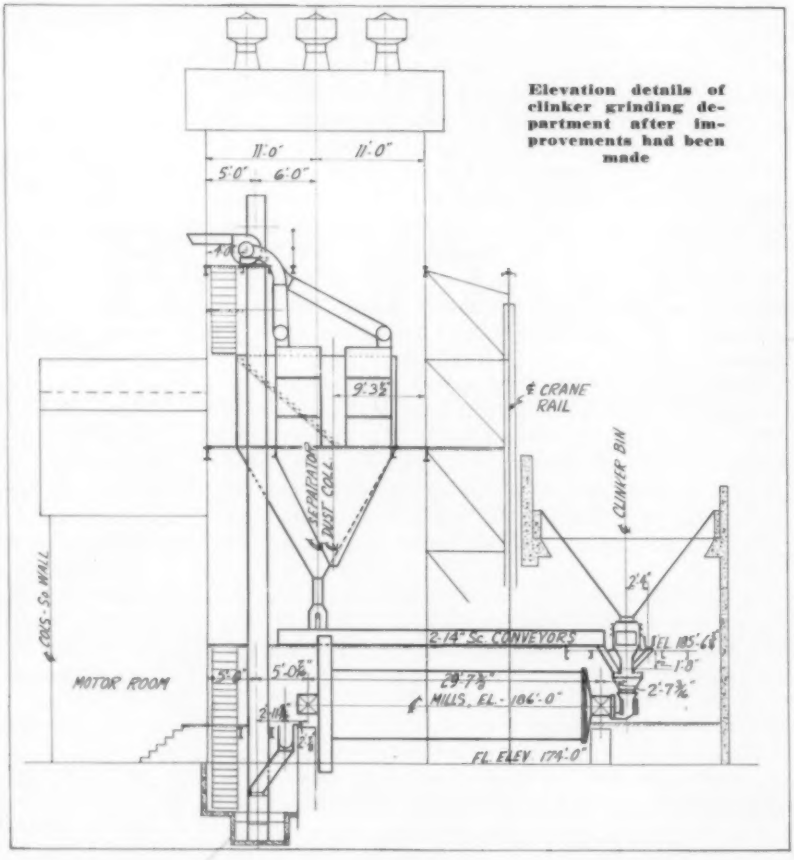
### Make Seven Cements

Products manufactured include: standard portland cement; "ONE-DAY" an high early strength portland cement; "PRONTO" a quick-hardening portland cement; "AD-MIX", a portland cement with 3% of diatomaceous earth co-mixed; "PLASTI-SPRED" a masonry product; "PLASTI-SIL" a puzzolanic cement, and a sulphate resisting cement. The last two mentioned were introduced since 1936.

High and low calcium stone is shipped in by rail and ground with water to slurry in the compartment mills. The water is introduced simultaneously with the material fed by table feeders. As a check on plant output, water is measured in cubic feet through a Neptune Trident water meter. This serves as a measure of slurry output for each individual mill as well as a check in this department on clinker produced. The chemist samples the slurry to maintain a slurry consistency of about 30 percent moisture, and checks the amount of slurry pumped to the kiln feeders.

Kiln feed is ground to 90 percent through 200-mesh in open circuit using 2½-, 3-, and 4-in. forged steel balls in the preliminary end and ⅞-in. balls in the finish compartment. A Wilfley pump pumps the slurry over a 16-mesh screen into tanks and blending takes place in a kiln feed tank with the capacity of three regular slurry storage tanks. After blending, it is pumped to Allis-Chalmers ferris wheel feeders which are rope-driven directly from the kiln gear train, thus insuring a constant depth of load in the kiln regardless of kiln speed.

This is one of the few plants where kiln revolving speeds have not been increased in an effort to step up capacity. Kilns turn within a range of one revolution in two minutes to four minutes—unusually slow when compared with the majority of plants. However, kiln capacities are maintained at about 1480 bbl. per day each, exceeding guarantees, by control of consistency and amount of feed, and the firing operations. For burning control, gas volume is controlled with a Brown recording orifice meter, and a Merriam indicating flowmeter shows the volume of primary air, the two being effective in keeping a constant gas-to-air ratio. A 1200 B.t.u. per cu. ft. gas is used. A revolution counter at the kiln drives




Elevation details of clinker grinding department after improvements had been made

# Seven Cements

**Numerous controls are used on gas-fired kilns and on finish grinding mills to produce a large variety of cements. Methods of proportioning clinker and gypsum and the introduction of admixtures are of particular interest**

keeps a record of the number of kiln revolutions made per shift, which is a check on production.

### Clinker Grinding

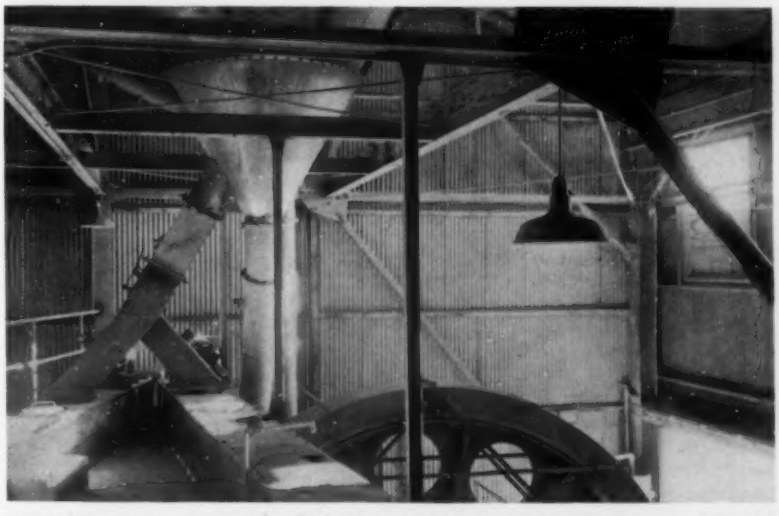
This concern developed a clinker conditioner several years ago (ROCK PRODUCTS, January 15, 1935, p. 88) which is a 100-ft. rotary cooler treater in which clinker is reheated from about 2100 deg. F. to 2300 deg. F. and then cooled in a reducing atmosphere. Upon discharge from the treater, the clinker is chilled by water to about 200 deg. F., and then is cooled to 120-130 deg. F. in handling by skipulter to storage and subsequent rehandling by power bucket into the mill feed bins. A 20 percent increase in grindability is claimed for the process.

Prior to 1939 all clinker was ground to cement by open circuit. Standard cement was produced by a single pass through the grinding mills and finished at 1680 sq. cm. per gram. The high-early cements were produced by passing the clinker first through one mill then regrinding the resultant cement through the second mill. The new mill arrangement consists of the same two 7- x 26-ft. compartment mills with feed into them proportioned by weight, displacing a volumetric method; a 16-ft. Raymond double-whizzer air separator, Norblo dust collector, and arrangements for accurately adding admixtures dry or in liquid form.

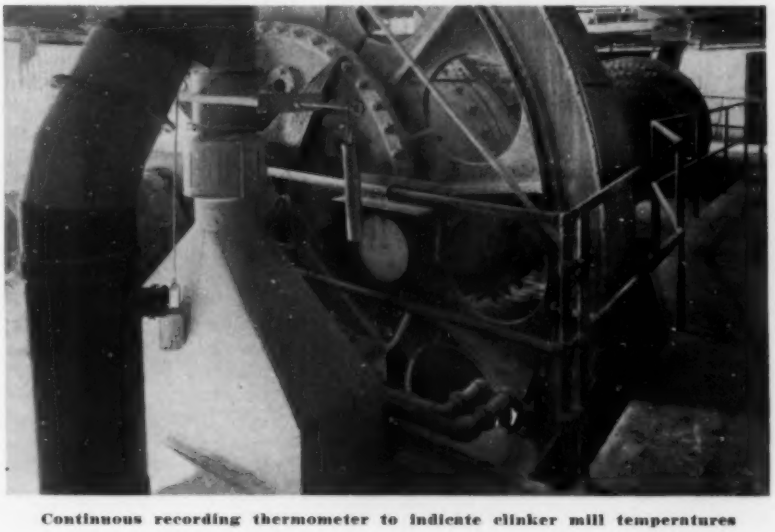
### Positive Feeds Into Mills

Four 24-in. Merrick "feedoweights", which operate in pairs to proportion clinker with gypsum into the two grinding mills, are located on the floor above the mills under the feed bins. Accurate control of feed by weight has proved much more effective in regulating mill feed than the

Close-up of "feedoweight" in center which is used to feed and proportion clinker and gypsum into grinding mills. Rejects return conveyor on the right, and in foreground is the hood and duct for catching dust



Showing method of returning separator rejects by screw conveyor into feed ends of mills. Note how water is added into stream to cool mills when temperature exceeds optimum



Continuous recording thermometer to indicate clinker mill temperatures

**Feed end of compartment mill. Open top hopper receives proportioned clinker and gypsum through vertical spout, rejects from chute below girder and liquid admix through small pipe**

old method of volume feeding, where bin segregation and other variables were uncompensated for. The setup consists of the "feedoweights" feeding gypsum and clinker in unison into a 14-in. screw conveyor (for each mill) which travels horizontally on the floor above the mills and discharges through a chute into an open top hopper set directly over the stub screw which feeds into the mill.

Standard portland cement is ground in a simple circuit with the air separator to 1680 sq. cm. per gram, and is handled by screw conveyors and bucket elevator, with cement spouting to a 6-in. Fuller-Kinyon pump, rejects returning back to the feed end of the mill. Rejects are split equally to two 14-in. screw conveyors, on the floor above the mills, which empty into the same open top feed hopper introducing fresh feed into the mills. Grate bars separating the two compartments, in each case, have been opened from ¼ in. to ½ in. and the loading is 20,000 lb. of 3-in. maximum forged steel balls in the first compartment (69-in. long) and 80,000 lb. of ⅞-in. balls in the finish end.

### Changes In Grinding For High-Early-Strength

In grinding standard portland cement, the air separator is set for the desired product and feed is added to build up a circulating load of approximately 75 percent. This figure is never allowed to exceed 100 percent in order to keep the product produced by closed circuit grinding fairly comparable in particle size distribution and flour to that produced by straight grinding. The ammeter on the air separator motor drive is the indicator of the circulating load carried and is closely watched. Between 104 and 114 amperes indicates a circulating load ranging from 75 to 100 percent, the meter readings being proportionate.

High early strength is produced as previously described under the open circuit method. At present the air separator serves merely as a conveyor to transport the cement from Mill No. 1 to Mill No. 2 for regrinding. The feed to No. 1 mill is set to give a surface area from that mill of 1900 to 2000 sq. cm. per gram. This has been found to be ideal feed for mill No. 2 to get a final product of 2560 sq. cm. per gram with maximum capacity. "PRONTO" cement has a surface area of 2300 sq. cm. per gram and is ground in the same way. Capacities for standard, "PRONTO" and "ONEDAY" are about 70 bbl.,

**Above: Instrument to measure gas volume. Below: Flowmeter to record volume of primary air**

64 bbl. and 42 bbl. per mill hour, respectively.

In order to get maximum grinding efficiency, close control is kept of mill temperatures and adjustment made to maintain this temperature. Each mill has a Foxborough recording thermometer at its discharge end where the material discharging passes directly over the recording element. Mill temperatures are kept to 265-275 deg. F., and when they exceed 275 deg. F. water is added, either as a spray on the mill shell, or within the mill, or both ways.

As water added within the mill is much more effective in reducing temperatures, a pipeline and spigot have been placed so that measured amounts of water may be introduced through an opening in the top of the housing for the screw conveyor returning rejects to the mills. Increments of a pint of water are added here until temperatures are again favorable. A pint of water per minute reduces the temperature at 270 deg. F. about 6 deg. F. Approximately 2½ bbls. of cement per mill per hour are recovered by a Norblo cyclone dust collector (intermittent rapping type) gathering dust from the mill and scale discharges. This is fed back into the cement pump.

"PLASTI-SPRED" is a stucco and masonry cement containing 15 percent puzzolanic material and about 0.03 percent per bbl. of a plasticizing agent which lends plasticity and increases sand-carrying capacity and spreading qualities for masonry work. The puzzolanic material is handled in sacks and added volumetrically into the feed for the mills. The sacks are emptied into a small hopper and the material is elevated and discharged into the screw conveyor carrying clinker and gypsum to the mill feeder. Removing or adding buckets is the means for controlling the amount added. The plasticizing agent is proportioned into the mill feed hopper by a volumetric pump. This product was introduced in 1937.

"PLASTI-SIL," ground to 1900 sq. cm. per gram, the same fineness as "PLASTI-SPRED," also contains 15 percent puzzolanic material but without addition of the plastic agent. Other products are a cement containing 3 percent diatomaceous earth, used to increase workability when employed with coarse sands, and a sulphate-resisting cement to which $Fe_2O_3$ is added in the raw mix to insure the cement having less than 5 percent $C_3A$.

The quarry, located 60 miles from the plant on the Merced River near Emory, Calif., has been improved lately with the installation of a Traylor TY crusher. Maximum sized stone delivered to the mill is ⅝-in.

**Pump on right for proportioning liquid admix. To the left, arrangement for introducing dry admix in clinker mill feed for special cements**

# Producing Sand For Glass

**Demand for finer gradings leads to increases in grinding and screening capacity, and improved methods of feeding materials**

By STAFF EDITOR

SPECIFICATIONS requiring somewhat finer gradings of industrial sands, principally for glass manufacture, are reflected in the improvements made in 1938 by Silica Co. of California, Ltd., at Brentwood, Calif.

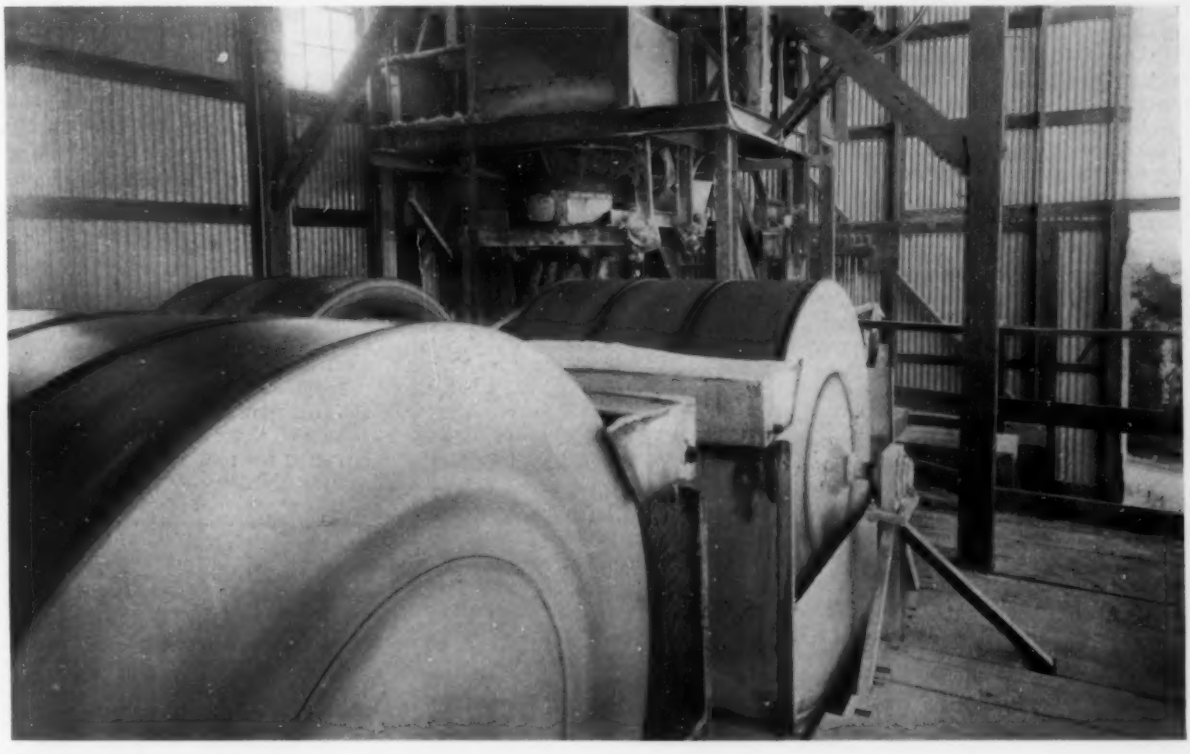
Glass sand has been the main product since the plant was built 10 years ago, with molding sand the only other product, the markets for which are principally in the San Francisco and Los Angeles areas. Today, with an enlarged plant and working a new deposit, two grades of each are being produced. Glass sand is now produced as minus 40-mesh as against minus 30-mesh, necessitating increased milling capacity. Capacity is now about 400 tons in 24 hours, most of which is put through a sulphuric acid leaching treatment, after drying, to reduce the percentage of $Fe_2O_3$, from about 0.14 to 0.04.

The process isn't new with the company, but is original, and is effective in producing high grade sands used in the manufacture of the better grades of glass. Principles of production are about the same as they were prior to 1938, but in the rebuilt plant screening surface has been increased, a larger ball mill is used, since more of the individual particles must be ground for a 40-mesh product, and equipment is better arranged to utilize gravity more effectively. A small wet grinding ball mill and a dry grinding pebble mill have been displaced by a larger wet ball mill, concentrating tables have been discontinued, and dewatering screens are no longer used.

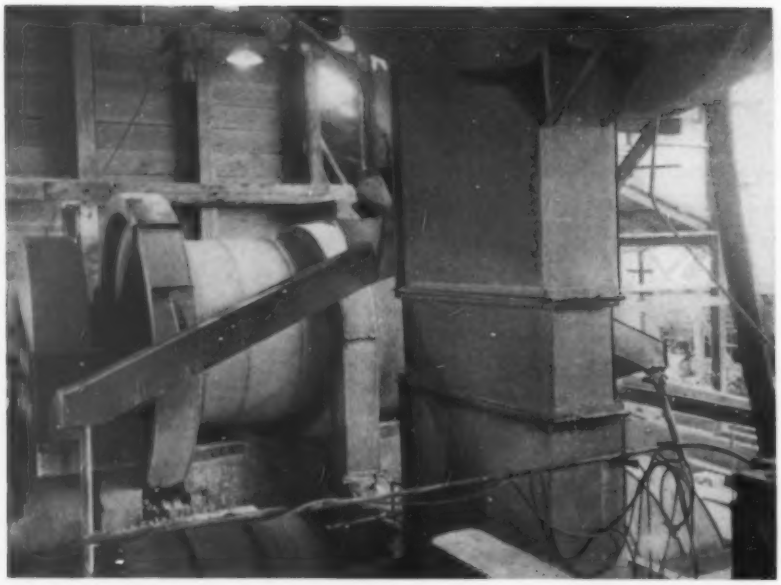
Until recently when the original deposit was depleted, the sand was stope-mined by the room-and-pillar method but now a hill of partially-cemented sand is being exploited by drag scraper. The sand bank stands about 60 ft. high and contains about 93 percent $SiO_2$, which is slightly lower than that in the depleted mines.

Upon shooting vertical holes driven by jackhammers all the material breaks down readily to the sand grains. Using a 1½-cu. yd. drag bucket powered by a 2-drum hoist, the sand is reclaimed into a hopper and fed out to a belt conveyor, any lumps being scalped out and passed through 12-in. Link-Belt rolls at the point of feed to the belt. The belt is horizontal, and is used to convey the sand out of the pit to a location more convenient for truck loading. Storage capacity is 600 tons, in three bins located along a roadway over which trucks haul the sand about 3½ miles to the treatment plan.

At the plant, bin storage of 500 tons was put in a year ago to insure an even flow of sand to the screening plant. A 12-in. screw conveyor from



**Four revolving sizing screens in the foreground, and scalping screen in upper background with distributor arrangement below it from which lines of flexible hose carry sand to sizing screens**



Back of elevator is the center-discharge type mill. At the head of the elevator can be seen the "floating" hopper to divide the mill feed into each end of the mill

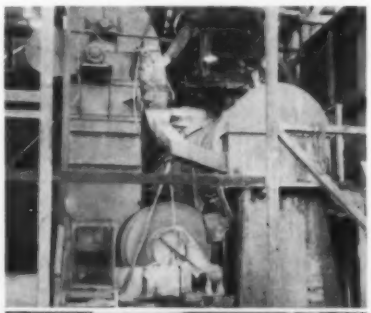
a truck discharge hopper feeds the sand into a bucket elevator to place it into storage, and it is reclaimed by belt conveyor into a bucket elevator to a scalping screen at the elevator head. Feed to the belt is regulated by a Jeffrey-Traylor vibrating feeder at the hopper outlet.

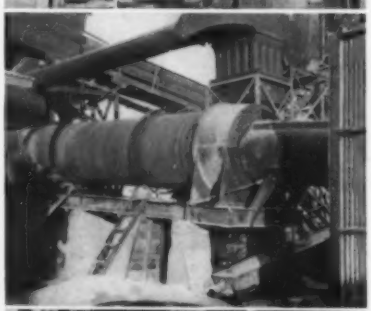
### Plant Changes

In rebuilding the plant, the incoming bucket elevator was lengthened, raising the screening equipment 15 ft. so that sand classifiers could be gravity-fed through launders. Until the new pit was opened, a grizzley and rolls were set over the first of three revolving screens and the grizzley undersize, minus ¾ in., put through the rolls and then the screen. Now, with the rolls at the pit, the entire elevator load is put directly through a 5- x 5-ft. Straub horizontal revolving screen.

This is a scalping screen which is designed primarily to protect the fine mesh cloth used on the sizing screens. In handling silica, an 8-mesh cloth of phosphur-bronze has proved more resistant to abrasion than ordinary steel wire. Undersize is the feed for four sizing screens and the oversize, a small percentage, joins the oversize stream from the sizing screens as feed to the ball mill. The sand contains some clay which is readily washed out by using plenty of water applied at various stages through the plant. In all operations, sand is diluted by about 80 percent water, a large part of which is added within the separate screens where there is some scrubbing action.

Sizing is done through four identical 4- x 5-ft. Straub screens which have 40-mesh stainless steel cloth and turn at 6 r.p.m. Feed to these screens is minus 8-mesh sand from the scalper which flows by gravity to a revolving distributor. The distributor comprises a steel box having compartments with a motor-driven revolving mechanism that splits the flow to each compartment from which it passes into sections of flexible rubber hose feeding into each screen.





### Classifiers Mounted on Rails To Move Over Bins

The minus 40-mesh screen product is laundered through a sloping wood flume into a small surge box so located with reference to a row of drain bins that an enclosed wood flume the length of the bins is the source of feed from it into classifiers. All the flumes in the plant are rubber-lined. The two Dorr rake classifiers, each consisting of two sets of 24-in. rakes, are each equipped with flanged wheels, making it a simple matter to move them on rails extending over the tops of all bins for discharge into a desired bin. At each bin location is a convenient flexible fitting to the main flume from the surge box.

In spotting a classifier over a bin, the feed box is kept forward in order to float out as much minus 150-mesh material as possible while washing it. In the bins, the sand is drained at least 24 hr. to about 5 percent moisture before it is reclaimed for further treatment.

Internal lifters discharge plus 40-mesh sand from the screens, which join the plus 8-mesh in a flume feeding a surge hopper over a 5- x 10-ft. ball mill. The ball mill, built by Straub Manufacturing Co., Oakland, Calif., is fed from both ends as shown in one of the illustrations, with a center peripheral discharge that splits equally into two 4- x 5-ft. Straub revolving screens.

Screens and the mill are closed-circuited by an enclosed belt bucket elevator and operate with a circulating load and water content regulated to reduce the sand to pass 40-mesh without production of excessive fines. The mill is a compartment type similar to those used in some cement plants, with grid bars to hold back the grinding media, which are forged steel balls.

Fresh feed material and returns elevated from the screens below (plus 40-mesh) enter a splitter above the center of the mill, which is in reality a "floating" tapered hopper on ball

*(Continued on page 48)*

Top view: Milling arrangement for grinding wet plus 40-mesh sand; to the right of elevator is ball mill and below may be seen one of two screens in closed circuit with mill. Center: Closeup of sand dryer and the Multiclone dust collector. Below firing end of dryer is inclined screw conveyor used to feed the acid-treatment plant. Bottom view: Two of the seven vibrators applied to pipe used to convey dried sand from dryer

# A Clinic
## On Operating Problems

### Sand Dewatering Problem

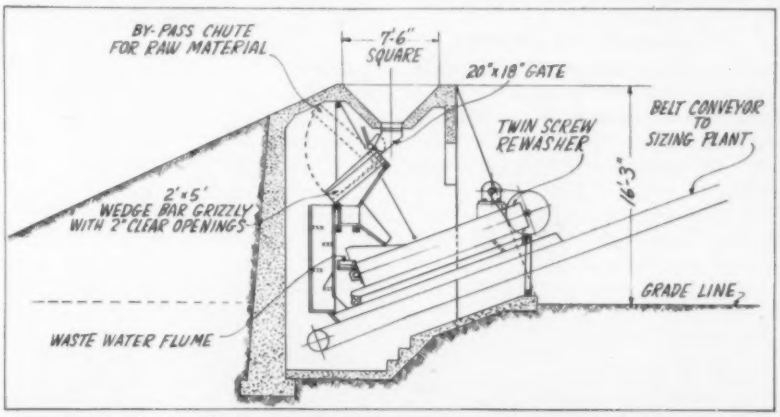
"We have a problem in feeding material to our primary conveyor belt that we have not yet been able to solve satisfactorily.

"Our material is furnished pumped through a 10-in. pipe line and deposited in a dewatering sump, approximately 75 ft. wide and 200 ft. long with material 10 ft. deep. The material being pumped is a mixture of sand and gravel, the largest size, 5- x 8-in., amounting to not over 0.5 percent , with the total percentage above 2-in. not over 10 percent. Excess water is removed by an overflow flume. However, the material contains a fair proportion of fine sand and therefore retains a fair amount of water. Pumping into a dewatering sump is done at night because of favorable power rates.

"Material is excavated by scraper bucket from the dewatering sump into a field hopper and put through the plant in daytime operation. The 1½ cu. yd. scraper handles 60 cu. yd. per hour. For the first several hours the feed is comparatively dry and works nicely. Later, however, the water retained in the sand collects in the cut and the material becomes very soupy. Thereafter the troubles begin. We have tried an apron feeder and a reciprocating feeder, and neither has been satisfactory both by reason of excessive wear and also because neither has been sufficiently tight to withstand the surge of soupy material as it dumps from the scraper into the field hopper.

"We are wondering if you may have some data on similar conditions of other producers and whether you would be able to suggest a type of feeder which you think might work under the circumstances."

Several suggested remedies were offered. One recommendation was to increase the size of the sand sump and lay open joint drain tile in the bottom to facilitate drainage which would enable present feeders to handle the material. Another suggestion was to make all the material a soupy consistency and pump the material to the screens.




**Arrangement for handling wet material to dewatering screw so that it can be fed satisfactorily to belt conveyor**

Manufacturers made several suggestions which apparently offered a satisfactory way of handling the material. In the illustration is shown a method worked out by one manufacturer. The arrangement is described as follows:

"You will note that we show a receiving hopper which can be made either of concrete, as shown, or of steel or wood construction. This hopper is equipped with a manually operated gate which has an extended chute. When this extended chute is in the upper position, as shown on the drawing, the material discharged through the quadrant gate passes over a grizzly equipped with about 2-in. clear openings. All gravel over 2-in. is rejected by the grizzly and goes down a chute directly to the belt conveyor. All material passing through the grizzly which consists of minus 2-in. gravel, sand and water, goes to a twin screw rewasher which will dewater the sand and gravel and deliver a product to the belt conveyor which can be easily carried on the belt without spillage.

"The by-pass chute attached to the quadrant gate can be lowered so that it covers the grizzly, and in this case all the material from the receiving hopper would go directly to the belt conveyer. When operating this way, the twin screw rewasher would not be used."

Another manufacturer advises: "Our deduction from the information given would indicate that his trouble is probably in the method which he follows in dewatering the sand. Your letter states that the sand can be handled nicely for the first few hours but after this the amount of water which has been retained in the cut makes the material so soupy that it cannot be handled. We assume from this that the sump is below grade and, if this is the case, the water which settles has no way of escape. We know of existing plants where they follow the same general operation as that outlined but, in those cases, the sand is settled in concrete tanks built above the ground and provided with openings near the bottom covered with loose planking, which permits the water to drain out between the planks. Two such tanks are provided so that the operation is alternated from one to the other every 24 hours, which gives sufficient time to drain.

"In the case which you refer to, we doubt very much if the sand could be handled on the primary conveyor, even if a satisfactory type of feeder were installed. However, if the consistency of the sand is such that the conveyor could handle it, this sand could be fed successfully to this conveyor with a belt feeder. With this type of feeder, it is possible to provide sealing strips along the lower edge of the skirtboards and back plate of the chute which are fitted closely to the surface of the belt so as to prevent the material flushing out under skirt-boards.

A third recommendation by a manufacturer suggests the use of an electro-magnetic type of feeder installed on an incline and with surfaces having an initial polish as a satisfactory means of handling fluid material.

A fourth suggestion sent in by a manufacturer involves the use of a hopper with a half pitch helicoid conveyor as a feed. It is important that this length of half pitch conveyor be of such diameter as to fit fairly tight; that is, a rotating fit in a pipe or tube, and it must be long enough so that the material will not flood through. If the abrasive quality of the material is excessive, manganese flights are recommended.

# A "Push-Over"

By BROR NORDBERG

Unusual storage system provides for tunnel loading into trucks. Note how bins and stockpiles in center may be drawn through tunnel roof. In periods of high water, bin spouts are disconnected and trucks load above tunnels

EXCAVATING ROCK, SAND AND GRAVEL from San Gabriel Valley's outwash deposits for grading and marketing in the Los Angeles, Calif., area follows conventional methods practiced in other sections of the country except for the new plant of Graham Brothers, Inc., at El Monte.

Completed early in 1939, this plant was designed specifically to receive pit run material by large earth-movers powered by Caterpillar tractors and for intra-plant handling by the same power units fitted with "dozing" attachments.

Incoming pit run material is first put through a field hopper, which feeds on to a tunnel conveyor belt that carries the matrix to a primary crusher. At the crusher a separation is made with uncrushed and crushed material being handled separately, but simultaneously, over different conveying and screening equipment until they become finished products. The purpose of this arrangement, which is typical of all plants in the Los Angeles market, is to produce washed sand and gravel and unwashed crushed rock, according to customer specifications.

After separating out the sand and some re-crushing, the two flows of material are elevated by separate bucket elevators to their respective sizing screens which are located over the finished material bins.

Bin storage is very unique and consists of eight steel bins under the screening floor, four open storage compartments between and below these bins, and two large steel bins close to the screening plant. The latter two bins hold about 450 tons each, and are provided for storage of the faster moving products or blends of several grades taken directly from the sizing screens.

Total bin storage is about 2000 tons aside from 1000 to 1500 tons of sand stocked in open piles independent of all bins. This capacity, and the ratios of capacities of bins for certain grades of materials are provided in event of equipment breakdowns and to eliminate all possible re-handling.

### Two Levels for Trucks

All hauling is done by trucks which are driven through a reinforced concrete tunnel below the plant and the eight storage bins to receive their loads through bin gates. Each of the eight bin gates is controlled by a vertical pipe lever extending down in the tunnel below so that the bins above the tunnel may be drawn directly by the driver inside the tunnel passageway. As mentioned earlier, there are four compartments under and between the eight bins, resting directly on the concrete tunnel ceiling, which may be used for additional sizes or to take the overflow from any bin. Material from any of these compartments is similarly drawn into trucks below.

This unique arrangement, in addition to the flexibility which it affords, is designed to safeguard against high water and floods during California's rainy season. The pipes connecting each bin to the tunnel are bolted to the tapered bottom of each bin. If water is in the tunnel below, the pipes may be disconnected and other bin gates fitted directly to the bins. Trucks may then load directly from the bins at a higher level, using the tunnel ceiling as a roadway. As another safeguard in the event of floods or other disturbances, the load-bearing vertical plant uprights are tied in with the concrete tunnel, which provides an anchor that would be difficult to dislodge.

Between the primary crusher and the excavation there is set aside an area for reserve storage of pit run material, which is being filled during off plant operating hours. Plant capacity is about 400 tons including 13 gradings, but as excavating capacity is 320 to 350 tons the earth-movers during peak demand operate in excess of the plant hours. Ordinarily the surge capacity is equal to requirements of the plant for two or three days running.

Diesel-powered tractor and earth mover in action

### Diesel Tractors and Bulldozers Move Material to Plant

In the San Gabriel Valley, the deposit is of alluvial origin and contains sand, gravel and rounded cobbles and boulders which must be crushed. At the site of the new plant the percentages of each run about equal and there is no agglomeration and no overburden. In contrast to the company's plant in the San Fernando Valley near Roscoe, Calif., the deposit has no pronounced grades and is be-

# For Sand and Gravel

**Large earth movers powered by Diesel tractors bring pit material to plant and also are used for intra-plant haulage**

"Bull-dozing" raw material into hopper for handling to Roscoe, Calif., plant

ing worked very regularly over a wide area without any apparent depth. Normal cut is 6- to 8-in.

In operating a high, sloping bank at Roscoe, a Caterpillar Diesel and bull-dozer had been used to move material downhill into a field hopper feeding a belt conveyor. This experience in the operation of Diesel-powered movers was therefore available before building the new plant.

At El Monte two RD8 95-hp. Caterpillar Diesel tractors are connected separately to a 12-cu. yd. LeTourneau "Carry-All" and a 12-cu. yd. Emsco carrying unit. Each unit of a "cat" and carrier makes its trip to the field hopper, or surge storage, and returns to the point of excavation separately but when digging they are connected in tandem. This is done to utilize the full pulling power so that the maximum payload of 18 to 20 tons may be put into each carrier.

One of the "cats" has a bull-dozer attachment for intra-plant moving of material with a pin and socket connection which permits this unit to be quickly harnessed to the one in front. The procedure is to operate both tractors in filling the first carrier and then start the second one to digging, each carrier being filled separately by the power from two tractors. Once loaded, the units are uncoupled and each proceeds to the field hopper. Operating singly, it was only possible to load 14 to 16 tons in each carrier. The haul is kept down to 800 or 1000 ft., which will account for a lot of material before reaching the depth of about 90 ft. where water is encountered.

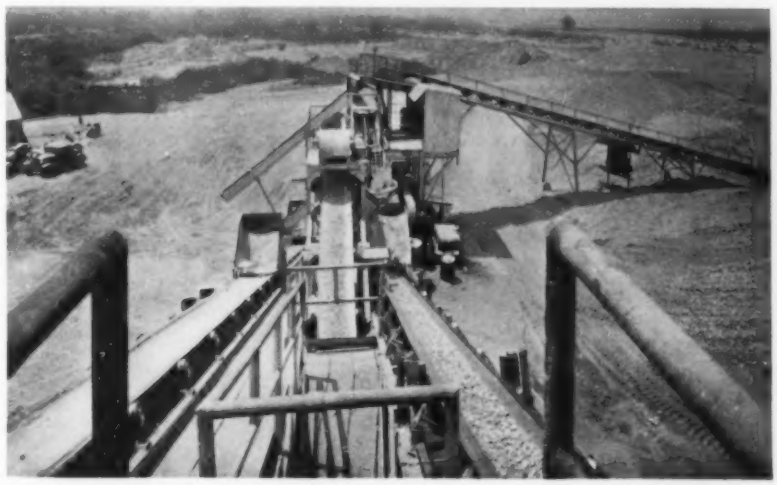
### Methods of Controlling Flow of Material

Operations are very economical, for such a large tonnage handled, since only two men are required in the pit, and fuel consumption is about 4½ to 5 gal. per hour for each tractor.

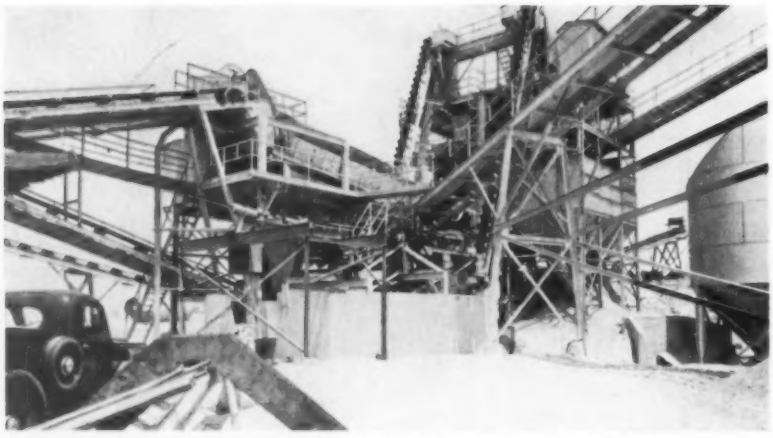
At the field hopper, filled either direct from the pit, from the surge pile, or with material from stock to be recrushed, material is fed by a Jeffrey-Traylor vibrating feeder to a 48-in. conveyor belt, 140-ft. centers, which discharges over a 4- x 8-ft. Link-Belt vibrating, scalping screen. Here, plus 3½-in. stone is sent to an 18-in. Telsmith gyratory crusher and the throughs by-pass the crusher, crushed material and uncrushed discharging to separate conveyor belts for later refinement.

Before discussing the flow further, several features of plant control tied in with the primary belt operation are worthy of special mention. The rate of feed from the hopper to the belt is variable and may be regulated within a range of 150 to 700 tons per hour by a rheostat control operated by the mill man. The amperage is adjusted to compensate for feed variations caused by wet material or for other reasons. A Westinghouse continuous recording ammeter is connected into the electrical circuit to indicate the duration of delays and the time when they occur. This provides a record which is used to tie in with the report of the mill man in determining causes of delays in operation so that they may be remedied. Incidentally, time lost by delays during operation has been reduced from 21 percent to about three percent as a result of a systematic search for causes. Occasional checks on the primary belt tonnages are also made by simply throwing a plant by-pass chute at the crusher head, diverting material into trucks which are then weighed.

Looking down to primary crusher with raw material conveyor to the right. Separate belts convey uncrushed and crushed material, one to trommel screen, the other to the crushing and screening equipment



Products manufactured generally include four gravel grades (washed), a pea gravel, concrete sand (3/16-in. minus), three or four grades of crushed rock, dust (5-mesh minus) and a 4-mesh to 5-mesh product used for top coatings, etc. Crushed rock (1-in. minus) from the primary crusher is carried by a 24-in. conveyor belt to a 4- x 12-ft. Symons double-deck screen. Considerable flexibility is provided at this screen and a 4-ft. Symons cone crusher below. Rock over ¾-, 1⅝-, or ⅜-in. retained on either or both screen decks may be put through the reduction crusher and then returned over a 24-in. belt to the belt feeding the screen, the screen sizes by-passing the



In the foreground is the sand rake classifier, above is the trommel screen, and to the right are separate bucket elevators to handle crushed and uncrushed material

crusher being elevated to the sizing screens over the plant bins. At times oversize material from the screen is carried to stockpile directly over a stacking belt conveyor to be reclaimed later by the bull-dozer.

Crushed sizes down to $^3/_8$-in. are taken off to bins over a 4- x 8-ft. double-deck Symons screen, and minus $^3/_8$-in. material is put over a 4- x 10-ft. Robins screen to separate out the finer mesh sizes and dust. Wherever feasible, stone is discharged to the various screens through stone hoppers, as illustrated, in order that stone may "ride" on stone to reduce chute wear.

Uncrushed gravel and sand bypassing the primary crusher is carried over a 28-in. conveyor belt to a 24-ft. 3-jacket trommel screen with a 48-in. inner diameter. Here an oversize is diverted to the cone crusher, the gravel is separated out for elevation to the sizing screens and minus $^3/_{16}$-in. material with water is diverted to rake classifiers to make concrete sand. All washing is done through the trommel screen.

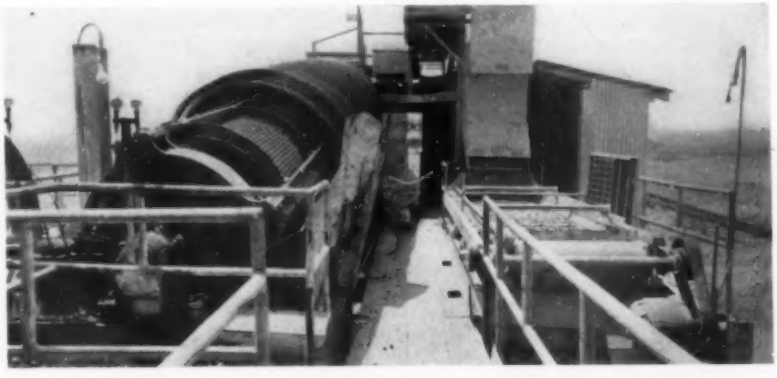
### Blending Aggregates

After dewatering in passage over the classifier drainboards, sand is carried by a short belt conveyor to a stacking belt conveyor for storage on the ground. Pea gravel is diverted directly from the trommel to a stacking belt conveyor when the bin is full. Gravel is sized over two double-deck vibrating screens, a 42-in. x 12-ft. Symons and a 42-in. x 8-ft. Robbins. From the top deck of the lower screen, a belt conveyor carries gravel into the large bin storage, separate from the main cluster of bins, which comprise two bins with a capacity of 450 tons each. This belt conveyor is so installed that seven different gradations may be put directly on it from the screens, either for blending purposes, or for re-combining into the two large bins or they may be first put over a 4- x 10-ft. double-deck auxiliary screen over these bins to produce special sizes.

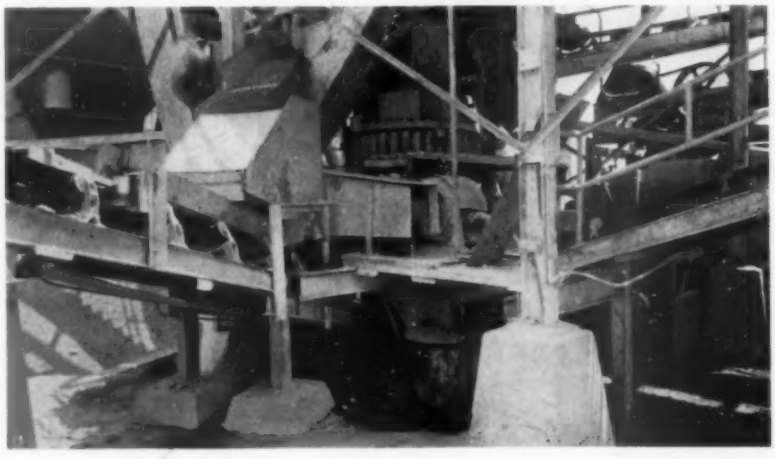
Steel forms, 16 ft. in diameter, used in construction of the Metropolitan aqueduct, are used as a shell for the primary belt tunnel and for loading out sand into trucks from stock dozed over the tunnel. The various products stocked in open storage from stocking conveyors are bull-dozed into the field hopper (if stone) or over the tunnel (if sand) for later processing or loading out. Pea gravel is reclaimed similarly into a ground hopper discharging into a small screw conveyor which empties onto the 28-in. belt carrying material by-passing the primary crusher.

The plant is entirely of steel and has 510-hp. in connected electrical motors and all the drives are V-belt with gear reduction. It displaces one of 200 tons hourly capacity and is under the supervision of C. A. Peterson, division manager. J. P. Montgomery is plant foreman. Officials of the company designed the plant.

In addition to this plant and the one at Roscoe, Graham Bros. operate two producing plants in Orange county; two ready-mixed concrete plants and two bunker plants in Los Angeles; a concrete plant at Long Beach; an aggregate-handling plant at North Long Beach; and various transfer plants which are operated at the various job locations.



Above: Trommel screen on left separates out sand to a classifier beneath it. On right, crushed rock from primary screen is scalped. Below: Secondary cone crusher with provision to bypass to the stockpile conveyor on the left



# Check Screens For Efficiency

**ARTICLE NINE**

**On crushing, sizing, testing and specifying of aggregates shows results of 600 grading tests**

By ELWOOD T. NETTLETON*

PRODUCERS IN GENERAL have recognized the fact that a change in the screen openings will affect not only the size of the stone, but, also, the percentage of that size produced. Just how much this change is in grading analysis or in percentages produced has been more or less of a guess.

There is considerable difficulty in obtaining exact figures on this because of the numerous variables present. However, with the idea in view of obtaining some sort of an approximation, the change which ⅛ in. in screen openings made was calculated in three ways—first, the straight line theory; second, grading analysis; third, actual production figures.

*Straight line theory.*—Assume that the stone being screened was scalped on a 2⅝-in. sq. All the stone would then range from 2⅝ in. square to 0. According to the amended straight line theory, shown in the graph, a very negligible part would be larger than 2½ in. sq. and about 10 percent smaller than ¼ in. sq. The crusher grading of the 90 percent of the stone falling between 2½ in. sq. and ¼ in. sq. would be a straight line.

2½ in. sq. — ¼ in. sq. = 2.25 in.
multiply 2.25 × 8 (number of ⅛ in. in an inch = 18.00

$$\frac{90}{18.00} = 5.0$$

In other words, the change of a screen ⅛ in. would produce a 5.0 percent change in grading and in the production of a particular size.

Assume stone being scalped on a 2¾-in. round = 2¼ in. sq. As above, approximately 100 percent would, therefore, passes a 2⅛ in. sq., and 10 percent would pass a ¼ in. sq. The grading of the 90 percent between 2⅛ in. sq. and ½ in. sq. would again be a straight line.

2⅛ in. sq. — ¼ in. sq. = 1.88 in.
1.88 × 8 = 15.04

$$\frac{90}{15.04} = 6.0$$

*Grading analysis.*—Six tests were run at the Middlefield quarry. Three of these were grading analyses on stone screened between 2⅝ in. sq. — 1⅝ in. sq.; the other three were run with the 1⅝ in. sq. changed to 1¾ in. sq.

| | Percent Passing 2½ in. sq. | Percent Passing 2 in. sq. | Percent Passing 1½ in. sq. |
|---|---|---|---|
| (2⅝—1⅝) | 100 | —89.1 | —31.3 |
| (2⅝—1¾) | 99.9 | —85.7 | —26.0 |
| Differences | 0.1 | 3.4 | 5.3 |

This figure of 5.3 compares very favorably with the straight line figure of 5.0 (calculated with a 2⅝ in. sq. scalper).

* Engineering Director and Secretary, New York State Crushed Stone Association, Albany, N. Y.

VARIATIONS IN COMMERCIAL SIZES OF DIFFERENT PLANTS

| Sizes 2-in.-1¼-in. Mixed Stone | | Connecticut State Specification | | Middlefield | Rocky Hill | Plainville | Granby | Cheshire | North Branford |
|---|---|---|---|---|---|---|---|---|---|
| Test Screen | Quarry Screen | Percent Passing "A" | "C" | 2⅝ in.-1 in. square | 2⅝ in.-⅞ in. square | | 2⅝ in.-⅞ in. square | 2⅝ in.-1 in. square | 1¾ in.-1¼ in. square |
| 3 in. | | 100 | | 100 | 100 | | 100 | 100 | 100 |
| 2½ in. | | 95-100 | 100 | 99.9 | 100 | | 100 | 100 | 100 |
| 2 in. | | (20-100) 20-80 | 90-100 | 90.0 | 89.5 | | 87.0 | 94.2 | 100 |
| 1½ in. | | 0-65 | 0-70 | 51.2 | 59.1 | | 54.2 | 66.7 | 75.6 |
| 1 in. | | | | 13.6 | 20.7 | | 18.1 | 27.6 | 7.4 |
| ¾ in. | | 0-15 | 0-10 | 5.1 | 10.7 | | 8.4 | 10.2 | 1.5 |
| ½ in. | | 0-5 | | 3.0 | 3.8 | | 4.9 | 3.0 | 0.8 |
| ¼ in. | | | 0-5 | | | | | | |

| 2-in. STONE | | Connecticut State Specification | Middle-field | Rocky Hill | Plainville | | Granby | Cheshire | North Branford |
|---|---|---|---|---|---|---|---|---|---|
| Test Screen | Quarry Screen | Percent Passing "B" | 2⅝-in.-1¾-in. square | 2⅝-in.-1⅜-in. square | 2⅝ in.-1⅜ in. sq. "E." | 2¼ in.-1⅜ in. sq. "W." | 2⅝ in.-1¾ in. sq. | 2⅝ in.-1¾ in. sq. | 2¾ in.-1½ in. sq. |
| 3-in. | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2½-in. | | 95-100 | 99.9 | 100 | 99.3 | 100 | 97.8 | 100 | 100 |
| 2-in. | | (55-95 55-80) | 85.7 | 70.5 | 79.9 | 93.0 | 62.7 | 91.6 | 81.2 |
| 1½-in. | | 0-50 | 26.0 | 18.5 | 33.5 | 33.5 | 20.4 | 35.5 | 11.0 |
| 1-in. | | 0-15 | 2.9 | 2.3 | 4.0 | 3.3 | 3.6 | 7.9 | 1.0 |
| ¾-in. | | 0-5 | 1.7 | 1.5 | 1.8 | 1.4 | 1.5 | 5.1 | 0.8 |
| ½-in. | | | 1.3 | 1.1 | 1.0 | 0.9 | 1.0 | 3.6 | 0.7 |

*Actual production figures.*—Actual production figures were kept for two months at the North Branford quarry. At this quarry stone was scalped through a 2¾-in. round = 2¼-in. square. The retaining screen was for the first month 18 ft. of 2-in. sq., and for the latter month 12 ft. of 2⅛ in. sq. and 6 ft. of 2 in. sq.

The percent changed as follows:

| | | |
|---|---|---|
| May, 1936—Commercial 2 in., 28.3 percent | Commercial 1½ in., 31.2 percent | |
| July, 1936—Commercial 2 in., 20.9 percent | Commercial 1½ in., 37.0 percent | |
| Differences ..... 7.4 percent | | 5.8 percent |
| Average difference 6.6 percent | | |

This latter figure of 6.6 percent compares very favorably with the straight line theory for this case of 6.0.

As a result of these rough checks, it is reasonable to conclude that, other factors being constant, the percentage change in the amount of a product probably would be between 5 and 7 percent for each ⅛ in. change in screen size, with the lower percentages applying in case of the lower size scalping screens openings.

Naturally, the meeting of specifications is of vital importance to any stone producer. Scattered field tests by various inspectors on jobs, from time to time, do not give comprehensive enough or accurate enough results, due to the many variables involved. Furthermore, to find out after shipments have been made that such shipments do not meet the specifications is like locking the barn door after the horse is stolen.

### Averages by Commercial Sizes

Consequently, it was of vital importance to run numerous tests over a long period of time to establish what the writer chooses to call the normal plant grading averages. This was done for each different commercial size of stone at each quarry. Over six hundred grading tests were involved to arrive at this average.

The averages having been obtained by plants, a comparison of commercial sizes between plants was also tabulated. This comparison shows the difference in the same commercial sizes between various plants, due to slight variations in screen openings, type of screen, load factor, segregation in bins, and numerous other operating variables (see accompanying tables).

It was then attempted to compare these normal plant averages with the specifications of Connecticut, Massachusetts, Rhode Island and New York State. All four of the states' specifications varied at the time.* Unfortunately, the last three states did not use, in their specifications, exactly the same testing screen openings as Connecticut.

*(To be continued)*

*Note—Since these tests were run and as the result of information obtained by the writer presenting the commercial aspect to various testing engineers, the states of Connecticut, Massachusetts, New Hampshire and Rhode Island revised and adopted common grading specifications starting Jan. 1, 1939.

VARIATIONS IN COMMERCIAL SIZES OF DIFFERENT PLANTS

| 1¼-in. Stone | Connecticut State Specification | Middlefield | Rocky Hill | Plainville | Granby | Cheshire | North Branford |
|---|---|---|---|---|---|---|---|
| Test Screen / Quarry Screen | Percent Passing | 1¾ in.-1 in. sq. | 1¾ in.-⅞ in.-sq. | 1⅜ in.-⅞ in. sq. | 1¾ in.-⅞ in. sq. | 1¾ in.-1 in. sq. | 1½ in.-1 in. sq. |
| 2 in. | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1½ in. | 95-100 | 87.6 | 99.5 | 100 | 100 | 95.7 | 100 |
| 1 in. | 25-70 | 27.7 | 51.2 | 65.5 | 72.9 | 39.6 | 51.9 |
| ¾ in. | 0-25 | 9.1 | 21.6 | 26.7 | 33.2 | 18.5 | 3.2 |
| ½ in. | 0-5 | 3.2 | 5.0 | 5.6 | 16.1 | 7.6 | 1.3 |
| ¼ in. | | 1.9 | 2.3 | 1.7 | 10.2 | 4.5 | 1.0 |

| ¾-in. Stone | Connecticut State Specification | Middlefield | Rocky Hill | Plainville | | Granby | Cheshire | North Branford |
|---|---|---|---|---|---|---|---|---|
| Test Screen / Quarry Screen | Percent Passing "E" | 1 in.-11/16 in. sq. | 1 in.-½ in. sq. | ⅞ in.-9/16 in. sq. "E" | 1 in.-½ in. sq. "W" | ⅞ in.-⅝ in. sq. | ⅞ in.-⅝ in. sq. | 1 in.-½ in. sq. |
| 1½ in. | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1 in. | 95-100 | 99.8 | 100 | 100 | 99.5 | 100 | 100 | 99.7 |
| ¾ in. | (75-100 / 80-100) | 74.6 | 91.5 | 88.0 | 81.8 | 86.4 | 85.8 | 67.2 |
| ½ in. | 0-30 | 19.1 | 27.8 | 26.6 | 25.8 | 22.1 | 15.0 | 6.3 |
| ¼ in. | 0-5 | 2.5 | 2.2 | 2.2 | 2.3 | 2.7 | 4.8 | 3.0 |

| ½-in. Stone | Connecticut State Specification | Middlefield | | Rocky Hill | Plainville | | Granby | Cheshire | North Branford |
|---|---|---|---|---|---|---|---|---|---|
| Test Screen / Quarry Screen | Percent Passing "F" | ½-3/16 in., small 11/16-⅜ in. large | | ⅛-3/16 in. | 9/16-4½ in. sq. "E" | ½-6 in. sq. "W" | ⅛-3/16 in. sq. | ⅛ in.-¼ in. sq. | ⅛ in.-3/16 in. sq. x ¾ in. sq. |
| | | Sm. | Lge. | | | | | | 100 |
| 1 in. | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| ¾ in. | 95-100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 92.1 |
| ½ in. | 60-90 | 99.8 | 82.7 | 98.8 | 96.9 | 98.2 | 98.2 | 90.0 | 15.5 |
| ¼ in. | (0-20 / 0-10) | 42.2 | 7.7 | 9.6 | 26.1 | 33.5 | 19.6 | 21.1 | |

# Health In the Cement Industry

**Article 2 on this subject deals with the composition of dust in different departments of cement plants and its effect on workers**

By A. J. R. CURTIS*

IT HAS ALREADY BEEN SHOWN that after calcination there is practically no free silica present. Consequently much more attention has been devoted to dusts produced in processing the various raw materials which contain more or less quartz. Quarrying operations have been sufficiently discussed to indicate that they present no problems peculiar to the cement industry. In the raw mills, however, the grinding of siliceous shales and clays in combination with limestone creates dusts of unpredictable composition and behavior. The engineer must discover not only the proportion of free silica in the raw materials but its proportion and particle size in the atmospheric dust. Experience has demonstrated that the composition of dust settled on rafters is not always identical with that of the raw materials or of the dust fine enough to remain suspended in the atmosphere.

To determine the composition of air-floated material, it was usually necessary to rely upon relatively small samples of air-borne dust collected with a hand vacuum cleaner and samples that were allowed to settle upon large pieces of paper placed as near the breathing zone as possible. Operating the vacuum cleaner for periods varying from 15 minutes to 3 or 4 hours usually collected only enough dust for analysis of all particles regardless of their size. Only in one plant was the apparatus run long enough to collect a large sample which could then be fractionated and its component particle size fractions analyzed separately.

As might be expected, there is much less free silica in both simultaneously collected samples of atmospheric dust and settled dust than in the combination of raw materials being processed in a particular department. Air-floated and settled dusts from the same localities are not always identical although the silica values did not differ by more than 1 per cent in about half of the locations. While there were four instances in which the silica in the atmosphere was definitely higher, there was a general tendency for the settled dust to contain more quartz. The variations in these cement mill samples may have been produced by settling of occasional large particles on the collecting paper. In 13 of 17 raw mills, the air-floated dust contained 5 per cent or more free silica and in six of them the percentages varied between 15 and 60.

### Free Silica Content of Air-Borne Dust

To demonstrate whether such silica particles were small enough to produce disease it was necessary to separate the air-borne dust into fractions of different sizes and determine their free silica content. For this purpose the special large sample, mentioned above, was collected from the air near a mill grinding limestone with a shale containing 24 to 36 per cent of quartz. Of the fraction which contained only particles 3 microns and less in diameter, 5 per cent by weight was quartz. The total dust counts in this vicinity varied between 148 and 627 million per cubic foot. It is, therefore, estimated that the number of quartz particles of dangerous dimensions was of the order of 7 to 30 million per cubic foot.

Sampling dust at jackhammer drill with impinger

Such computations might suggest that there was a theoretical hazard from silica. However, still other factors must be taken into consideration. Not only must the silica particles be fine enough to be inhaled, they must be dispersed in the atmosphere and probably their surfaces must be relatively clean. Gardner and Durkan have demonstrated that particles of gypsum and of iron tend to flocculate with those of quartz so that aggregates are formed which settle out of the atmosphere with unusual rapidity because of their weight, and which are excluded from the nostrils of exposed animals because of their size. These clays at least theoretically should have similar effects upon quartz in the atmosphere. In grinding quartz with other minerals there is always a tendency to mash the softer substance upon the surface of the quartz grains. Surfaces thus coated are much less irritating to living tissues than those of clean, freshly fractured quartz.

These points are mentioned to indicate the difficulties of forecasting a silicosis hazard from mere physiochemical investigations of raw materials or atmospheric dusts. Examination of exposed workmen constitutes the crucial test of the hazard. Experience has shown that prolonged exposure to dust from rocks containing 30 per cent more of quartz generally produces silicosis, but experience is limited in the case of materials of lower silica content. Therefore, the hazard in the cement industry must be evaluated from the findings in workmen exposed for prolonged periods of time.

### Results of Physical Examinations

In the 11 plants where complete studies were made there were 2278 employes, of whom 299 worked in relatively dust-free atmospheres and 1979 in various departments where more or less dust was created. Approximately 85 per cent of the group

*Secretary, Committee on Accident Prevention and Insurance, Portland Cement Association.

were white males, 18 to 80 years of age. The remainder was composed of 185 Negroes, 138 Mexicans and 1 Japanese. Among the whites were 20 women employes.

The *age distribution* is significant. Nearly half (46.66 per cent) of all the persons on the payrolls are 40 or over and nearly one-fourth (22.03 per cent) are 50 or more years of age; 44.5 per cent of "male employes in production departments of New York State manufacturing industries in 1930" were 40 years and over and 20 per cent were 50 years and over. It will be noted that these figures are slightly lower than those for the cement group but the median age for both groups is about 38. The fact that the cement employes are slightly older rather than younger than the controls indicates the absence of a hazard that would shorten life.

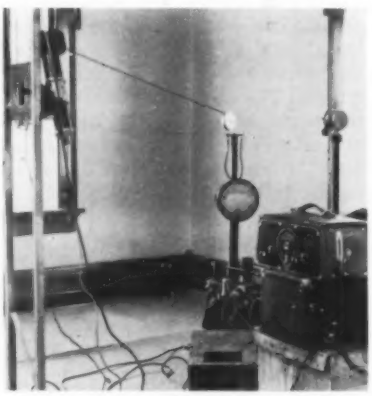
Of the exposed group, 55.42 per cent have been employed 10 years or more and 31.77 per cent for 15 years or more.

### Clinical Findings

Complete physical examinations of 2278 employes in 11 different plants situated in widely scattered parts of the country have demonstrated nothing even suggestive of a pneumoconiosis nor has any other condition common to a majority of cement workers been disclosed. Stereoroentgenograms of the same group have revealed certain variations of the usual pulmonary shadows. The same abnormalities also occur in the films of other industrial groups and are in no sense specific for these.

The roentgenographic interpretations have been classified in two categories: linear exaggerations and nodulation. In the first, the normal shadows cast largely by the pulmonary blood vessels are unusually prominent. The slightest degree of exaggeration designated as $P_1$ is so ill-defined that had not all the films been read by one observer there would be little point in discussing them. They will be considered here, not because they have any clinical significance, but because of a tendency among certain roentgenologists to attribute all possible variations from the usual pulmonary pattern to a dusty occupation. It should be clearly understood that changes of this intensity are not indicative of a disease process and that they may be produced by a variety of causes whose number increases with advancing age.

A more marked accentuation of the linear shadows in the pulmonary roentgenogram, designated for purposes of classification by the symbol $P_2$, is sufficiently unusual so that all observers recognize it although there are borderline cases, difficult to differentiate from exaggeration of lesser intensity. The pathological reaction responsible for the heavier vascular shadows may again be due to different causes but in groups of men employed in dusty atmospheres, the inhaled material is much more likely to have produced the change. As a general rule second degree linear exaggeration ($P_2$) is not associated with clinical symptoms. In the experience of the Saranac Laboratory, however, symptoms in men whose x-rays show this reaction could be attributed to associated conditions like heart disease or obvious bronchial infection.



**X-ray tube and portable mechanism used to examine workers' lungs. Note focus light on tube panel at left**

A still more marked exaggeration of the usual branching shadow pattern has been provisionally designated as $P_3$. The condition is rare and its cause is not definitely known. The shadows of the peripheral branches of the vascular tree are so heavy that they lose definition and tend to fuse. It is suspected that complicating infection may play a part in producing such appearances.

The second group of changes includes the shadows of silicotic nodulation whose characteristics are familiar.

### Roentgenographic Findings in Cement Workers

For analysis the employes were separated into two groups—the first comprising 1979 exposed to more or less dust in occupation (designated "Exposed") and the second, 299 office workers, laboratory employes, machinists, watchmen and others not often in contact with cement plant dusts (designated "Controls").

*Perhaps the most striking feature of the roentgenographic findings in the larger group exposed to dust is the fact that 82.06 per cent of the films showed no abnormality of any kind.* The changes that were noted in this group include 17.54 per cent classified as linear exaggeration of one degree or another and 0.40 per cent read as silicotic nodulation. The eight cases in the latter category will be discussed in detail later as most of them were apparently due to exposures before entering this industry. They are of little interest in this study.

Subdividing the cases of linear exaggeration according to the intensity of the reaction, it was noted that 14.91 per cent were read as $P_1$ and only 2.53 per cent as $P_2$. There were also two cases (0.10 per cent) of the rare $P_3$ type of change. These figures present a well-marked contrast to those for a group of hard rock miners, whose films were interpreted by the same observer. In them the total incidence of linear exaggeration was nearly three times as great: $P_1$ readings occurred in 32.33 per cent and $P_2$ in 13.18 per cent of the films. Many of these miners had been exposed to appreciable amounts of free silica, whose capacity to produce pulmonary reaction needs no comment.

Since the amount of *well-marked* linear exaggeration in the cement workers was so very small, there was a reasonable doubt as to whether any of it was produced by the dust that they had inhaled in this industry. Many of them had also worked in other places where they were exposed to dusts of different kinds. To throw more light on this question, a group of 274 plant employes was selected whose histories stated or whose age in relation to length of service indicated that they had never worked outside the cement industry, even on farms. None but persons likely to have been exposed to cement dust or its components were included. Of this group, 70 per cent had been employed for periods varying from 10 to 55 years. The films of 19 (6.93 per cent) were read as $P_1$ and five (1.82 per cent) as $P_2$. In other words, among those exposed only to cement plant dusts the percentage of first degree linear exaggeration was about half that for the group as a whole, and the percentage of second degree reactions was three-fourths as great as in the entire group. This comparison emphasizes the non-specific nature of the linear type of change and indicates that in the group as a whole, causes other than inhaled cement plant dusts contributed to its production. *(To be continued)*

# Washing—Classifying Sand

## Part 8.—Comparing the products of classification; how to interpret grading charts

By EDMUND SHAW

BEFORE discussing the work of classifiers and the products of classification, it may be well to discuss the methods of plotting these products so that the work of one may be compared with that of another or with the work of another sizing device.

The writer studied and experimented with several methods of plotting sieve tests before writing this, including unusual methods, such as plotting as areas instead of curves, and plotting on polar coördinates. One can find advantages in every method of plotting, but the greatest advantage, in his opinion, is found in the use of a plot with which his readers are familiar, and one so simple that no one can fail to understand it.

For this reason he will use for most plots the regular semi-log scale plot, with which almost everyone is familiar. This has the lines representing the testing sieve sizes spaced equidistantly; and while this is really logarithmic plotting we can forget about that unless we need to interpolate a sieve that does not belong to the regular series, based on the square root of $2\ (\sqrt{2})$.

There are two methods of plotting on this logarithmic chart, one, to plot the cumulative percentages *retained on* each sieve, and the other, to plot the cumulative percentages *passing* each sieve. The writer prefers the first for the purpose of this work, because the plots of the coarser gradings are toward the coarser end of the plot, and the nearer the center of the curve to the coarse end, the higher the fineness modulus of the grading. This is the opposite method from that generally used for plotting concrete aggregates and similar materials, but the figures of percentages passing are on one side, and one has only to reverse the chart to see the curves plotted with percentages passing. Most of the sieve analyses received in answer to requests are plotted in this way.

There are some persons who say they see no advantage in plotting gradings, and they say they can learn just as much from the tabulated figures. But this is because they have never really studied grading plots. To one who has done so, the instant he sees a grading curve he knows several important things. The position of the curve allows him to estimate the fineness modulus, the shape of the curves tell him something of the material. The products of rock crushers usually approximate straight lines; the general run of concrete aggregates lie in a lunette-shaped area; and natural sand gradings usually plot as an S-shaped curve, which suggests the curve of falling rates shown in Part 5 of this series. A vertical or nearly vertical curve shows the product to be made by two sieves close together in the series, and in general, the sharper the separation with any device the more nearly vertical the plot will be.

**EDITOR'S FOREWORD**

**No sand producer should be without some kind of a testing laboratory. This may be only a set of testing sieves and a shaker in the corner of the office; but in this day he should at least know the size gradation of his product from day to day.**

### Interpretation of Plots

In Fig. 1 are shown such curves as are usually found in plotting gradings of natural sands and products made from them by classification and screening. The curve marked No. 1 is the curve of a river sand, or other natural sand deposited by settling out of running water. No. 2 is the curve of a very coarse sand, which might be from the coarse end of a sand deposit, or a product that might have been separated from a fine sand. The position of the curve and its convexity show the sand to be coarse. No. 3 is the curve of a fine grained sand, and No. 4 is still finer. No. 5 is a typical classifier overflow, separating on 65-mesh, perhaps. Note that the fineness modulus increases as the convexity of the curve increases, and is less as the curve becomes concave.

Generally speaking, curves of natural sands and curves of classifier products are continuous and smooth. If the plot is not a smooth curve it is evidence that the classifier is doing poor work, or that something is wrong with the sampling and sieving.

The only other method of plotting

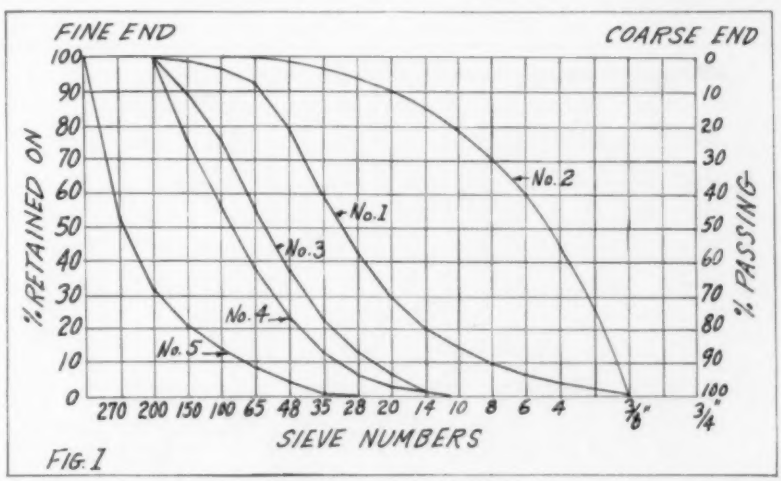



**Fig. 1: Interpretation of grading graphs. No. 1. Typical natural sand (F.M. 2.60). No. 2. Very coarse sand or classifier product (F.M. 4.58). No. 3. Fine sand for asphalt (F.M. 1.13). No. 4. Very fine sand (F.M. 0.88). No. 5. Classifier overflow (F.M. 0.26).**

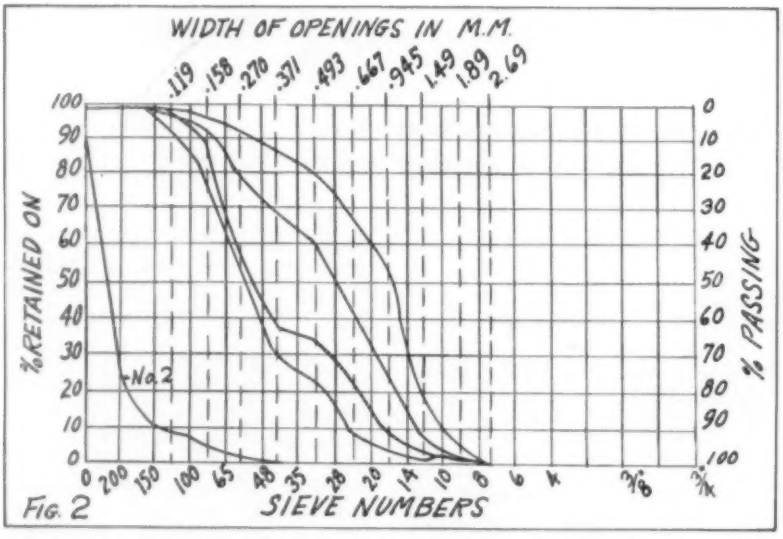



**Fig. 2: Work of launder pocket classifier making four sand products and overflow**

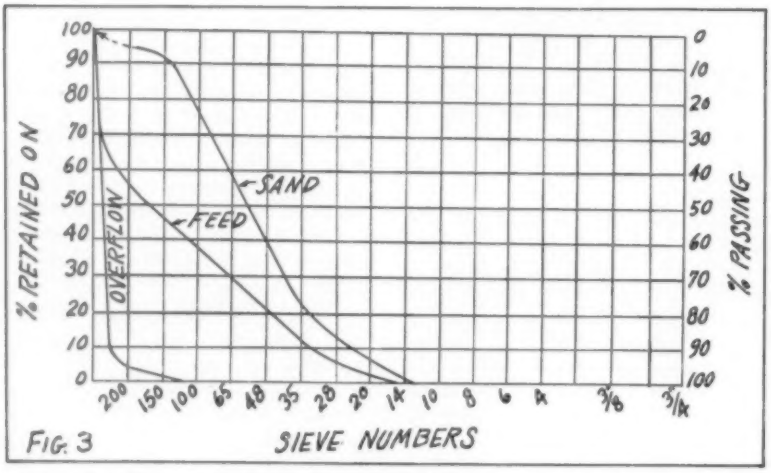



**Fig. 3: Products of cone with automatic discharge splitting feed on 200 mesh**

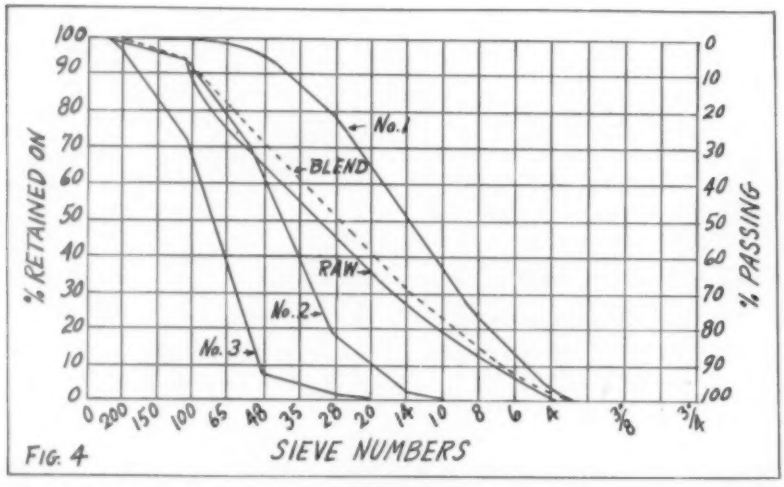



**Fig. 4: Products of three bowl classifiers which are blended to make grading shown by dotted line**

used regularly by the writer is a very simple one, devised to show to those who were not familiar with the work, and who could not get much from the ordinary logarithmic plot. This plot is made on a series of parallel lines, to represent the sieves used for testing, stacked with the coarsest screen on top. The blocks on these lines represent the weights of sand remaining on them. It is assumed that the sample weighed 100 grams, so these weights are percentages and are so marked on the scale above.

An advantage of this method is that it is easy to show how each size is divided by the classifier, provided the figures are available for showing this. Fig. 5 shows the feed, spigot discharge and overflow products of a hindered settling classifier, plotted in this way.

### Comparing Work of Classifiers

A number of graphs have been made to show the work of various types of classifiers—Figs. 2-7. Fig. 2 gives four spigot products and the overflow of a launder pocket classifier, like that shown in Article Part 3, except that this was fitted with hydraulic water. It is enough to look at the graph to understand that this classifier was not doing good work, the curves are so uneven. The data for this and for No. 2 are from Richards' *Ore Dressing*, an early edition, and the sieves are different from those used today. So the old style sieves have been interpolated, as shown by the dotted lines, and their widths of openings in millimeters are marked above. This was done by making a log. scale from a slide rule.

Fig. 2, No. 2 curve, shows the feed and three spigot products from three surface current classifiers in series. All three used hydraulic water, and all three are making good separations. The reason is probably that they were well designed and installed, as is evidenced by an illustration in "Ore Dressing" (Hydraulic Classifier No. 1, Mill No. 30). The discharge is through a slot, but the method of admitting the hydraulic water must have lessened some of the disadvantages of that form. An important point with this kind of classifier is the admission of the feed; and the illustration in this case shows that the feed apron had the proper angle and that buttons on the apron spread it evenly across the width of the entrance.

Fig. 3 is the work of a cone with an automatic regulation of the discharge, making a separation on the 200-mesh. It was doing somewhat re-

markable work because there is only 5.4 percent of minus 200-mesh in the spigot discharge and only 3 percent of plus 200-mesh in the overflow. The separation figures at about 94 percent, almost the efficiency of a laboratory classifier.

Fig. 4 is the work of three bowl classifiers in series at the original plant at Grand Coulee Dam. These were afterward combined in the right proportions to make the sand shown by the dotted line and marked "blend." The writer believes this to be the best separation by commercial classifiers that he has seen recorded. The blending was done to insure that the sand would meet rather rigid specifications. A description of the installation and its work was published in the March, 1936, issue of ROCK PRODUCTS, p. 30.

The washed concrete sand, marked feed, in Fig. 5, was split into a coarse concrete sand and a plaster sand. The reason is not plain. The feed would seem to be a good fine aggregate (F.M. 2.83), and the coarse sand (F.M. 4.04) would hardly do without adding some fine sand. The separation, made with a hindered settling classifier of the writer's design, is satisfactory. The reason for including it here is to show that there is no essential difference between the graphs of the products of a hindered settling classifier and those of free settling and mechanical classifiers.

The Fig. 6 graph is that of the work of a classifier of the spiral type in closed circuit with a tube mill, handling 5800 tons daily. This of course includes the original feed and the "return." This may seem a lot of tons, but the makers say they have the same kind of classifiers handling more than 12,000 tons.

The Fig. 7 graph is perhaps as interesting as any, for it represents a test that is not often made, a comparison of a classifier and a screen of a good type. Originally the screen was in closed circuit with a ball mill, doing rather fine grinding. After testing the two, a change was made to a classifier of the rake type, and the tonnage was more than doubled.

There is a close resemblance between the products of the screen and of the classifier, the principal difference being that the screen products show that the mill is grinding finer than it did with the classifier. That is reasonable because it ground so much less, for the tonnage of finished product was more than doubled by installing the classifier.

*(To be continued)*

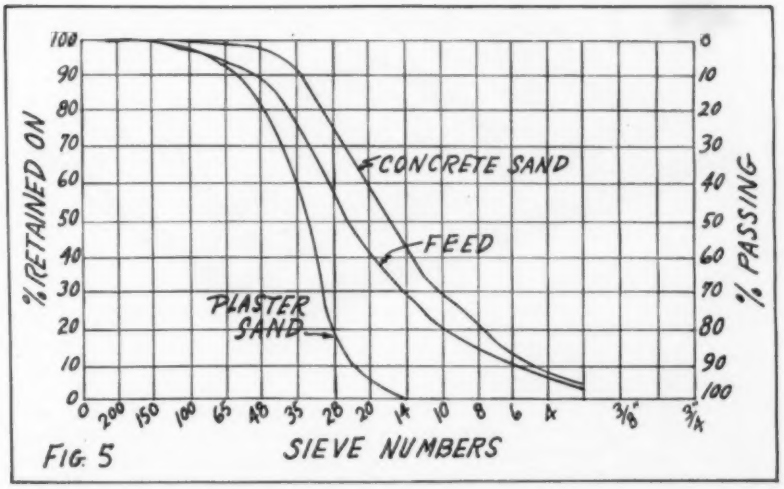



**Fig. 5: Concrete sand and plaster sand made from feed shown by the operation of a hindered settling classifier**

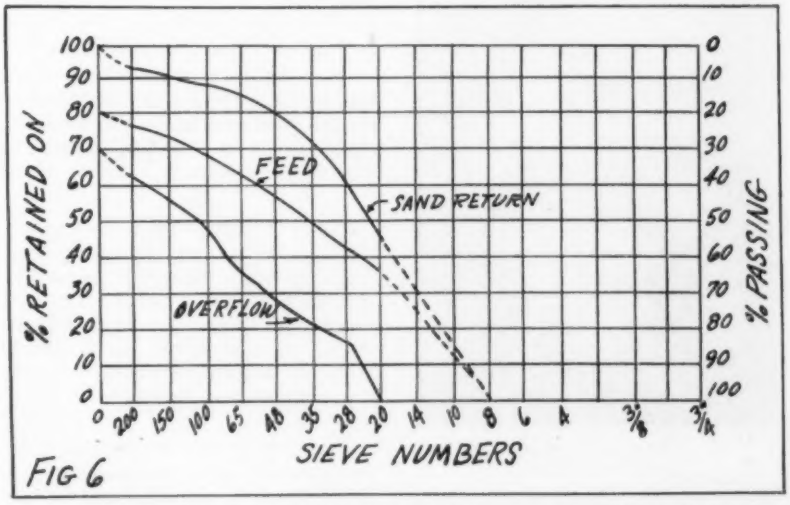



**Fig. 6: Work of classifier in closed circuit with ball mill handling 5800 tons per day. Note broken line curve where no screens are given**

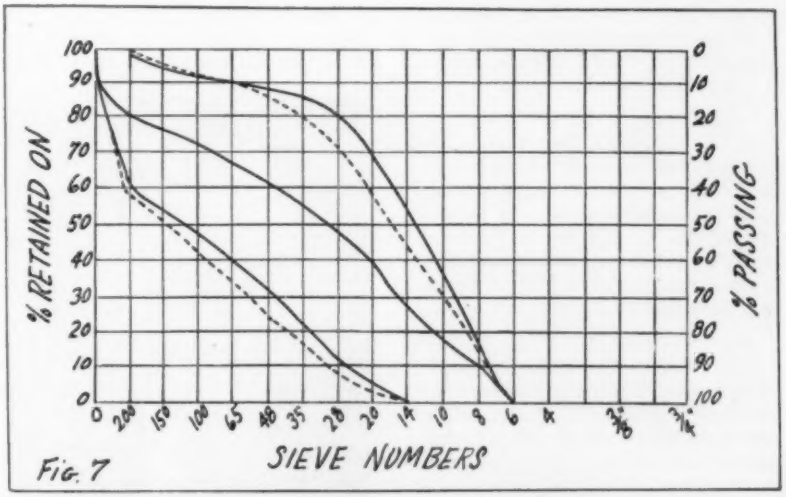



**Fig. 7: Comparison of classifier and screen, both in closed circuit with ball mill. Screen products shown by broken line curve**

# NEWS ABOUT PEOPLE

IRVIN L. CLYMER has been elected president of Michigan Limestone & Chemical Co., Rogers City, Mich., to succeed John G. Munson, who was recently elected vice-president of raw materials of the United States

Irvin L. Clymer

Steel Corp. Mr. Clymer is a graduate of Purdue university and joined the company in 1926 as chief engineer. Prior to that he had served with the Robins Conveying Belt Co. as draftsman and engineer. He has been vice-president since 1938 and is succeeded by Joseph Penglase.

•

A. E. DOUGLASS has been elected president of Allentown Portland Cement Co. and Valley Forge Cement Co., Catasauqua, Penn., to succeed the late R. E. Weaver. C. H. Breerwood continues as vice-president and general manager, and F. A. Weibel as secretary and treasurer.

•

JACK W. HUSSEY has been appointed manager of gypsum sales of Celotex Corp., Chicago, Ill. Before joining the company in 1937 he was a technical service manager of the Universal Atlas Cement Co. for eight years and later owned and operated the Jack W. Hussey Construction Co.

JOHN C. SPRAGUE, who has contributed articles in ROCK PRODUCTS on aggregates, has resigned as chief of the Concrete and Soils Section, U. S. Engineers Department, Huntington, W. Va., District, to go with the Dravo Corp., Pittsburgh, Penn., as development engineer.

•

J. E. REYNOLDS, superintendent of the Findlay, Ohio, plant of the National Lime and Stone Co., recently underwent a successful operation for a rare spinal ailment.

•

FLOYD F. GREEN, who recently resigned after serving seventeen years in the sales department of the Southwestern Portland Cement Co., at Columbus, Ohio, has been elected mayor of Columbus. He resigned from his position with Southwestern to campaign for the office.

•

FRANK GAUTIER, vice-president of Consolidated Rock Products Co., Los Angeles, Calif., has returned to his duties after an enjoyable and interesting world tour. He traveled 23,000 miles, using practically every mode of transportation known to man, and visited 27 countries of Europe and Asia. Among the things he brought back are some excellent moving pictures to preserve the highlights of his tour.

Frank Gautier

•

P. F. STAUFFER has been elected vice-president of Fuller Co., Catasauqua, Penn. "Pete" is probably one of the best known and best beloved salesmen who have contacted the cement industry. He joined the late Col. Fuller when a youngster and has been a loyal and most capable employe and officer of the Fuller companies ever since.

•

JAMES H. "UNCLE JIM" MCNAMARA, president and general manager of the Eagle Rock Lime Co., Eagle Rock,

James H. "Uncle Jim" McNamara

Va., and also treasurer of the National Lime Association, was remembered on his 80th anniversary, October 25, by many telegrams and letters of congratulations from his many friends.

•

J. O. LANE, for many years assistant treasurer of Southern States Portland Cement Co., Rockmart, Ga., has been appointed secretary-treasurer, succeeding the late Bartow Cowden. D. B. Simon, Jr., has been elevated to acting superintendent, filling the position of the late D. B. Simon, Sr., and Albert Donnaud has been named sales manager for Georgia with offices in Atlanta.

•

W. J. WORTHY, formerly superintendent of the Toledo, Ohio, plant of the Medusa Portland Cement Co., has been transferred to the executive offices of the company at Cleveland, Ohio. He is succeeded at Toledo as superintendent by G. M. Jarrett.

*(Obituaries appear on page 71)*

# How Efficient Is Lime Kiln?

**Arguments in favor of calculating lime kiln efficiency on the basis of available rather than total heat**

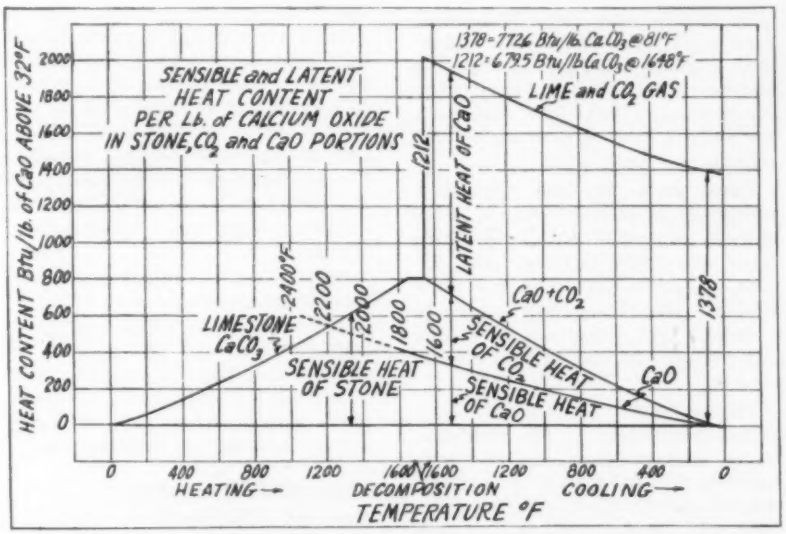
**LIME FORUM**

**Victor J. Azbe, conductor of this Forum and author of the article describes it as presenting the confusing and almost insurmountable difficulties encountered in calculating lime kiln efficiency, either shaft kiln or rotary kiln.**

In determining lime kiln efficiency the customary procedure is to assume that the theoretical kiln will have a cold top, a cold bottom, and will lose no heat by radiation and that the only way in which it will utilize heat from the fuel is in dissociation of carbonates. The basis that has been used is that 1378 B.t.u. were required for each pound of CaO and 1215 B.t.u. for each pound of MgO. The method is as follows:

$$\frac{\text{CaO in lime} \times 1378 + \text{MgO} \times 1215 \times \text{Ratio}}{\text{Heat value of one pound of coal}} \times 100 = \text{Percent efficiency.}$$

By this method of determination 100 percent efficiency would mean a ratio better than 10 to 1, when fuel was 13,780 B.t.u. content, as 1378 B.t.u. are needed for dissociation of carbonate to one pound of calcium oxide. With dolomite, the ratio would be slightly higher.




**Graph for determination of sensible and latent heat content per lb. of calcium oxide in stone, $CO_2$ and CaO portions**

Unfortunately, all is not so very simple. There are innumerable complications, brought on in part by the fuel, by the lime and by the kiln. Taking the fuel as first example, the stated heat value is not at all the available heat value. The 1000-B.t.u. per cu. ft. natural gas is actually only 900 B.t.u. gas. While in the calorimeter, it produces 1000 B.t.u., since moisture from combustion of hydrogen would be condensed and its latent heat released. That cannot take place in any lime kiln, so why blame the kiln with this loss?

If, on the other hand, the fuel is coke, due to its very low hydrogen content, almost the full calorimeter heat value will be produced in the lime kiln and available in sensible form. Even of this, the ideal theoretical kiln could not use all. If such a kiln cannot use all of this heat, why again should we blame the actual kiln and give it lower efficiency than is just, and blame it with failure of something not in its nature to accomplish?

Another great discrepancy is brought about by the fact that a kiln ordinarily considered as one unit consists really of three entirely distinct units, each having a different duty to perform. In one, the stone is preheated, in the next it is calcined, in the third the lime is cooled. Each of these operations has its own operating efficiency, that could be determined if the zones did not run into each other. This intermingling not only makes it impossible to gauge exactly the performance of the independent zones, but when lime contains magnesium, makes even the determination of overall efficiency nearly impossible.

No one would disagree that efficiency of a kiln should be evaluated on the basis of the heat of the fuel theoretically retainable in the kiln, together with the expectation that the kiln will do its theoretical utmost to utilize this heat. But what is this theoretical utmost?

### Available Heat

Heat from fuel can be divided into four portions:

1) Heat available for calcination of $CaCO_3$—"High Heat"—1650 deg. F. and up.

(2) Heat available for calcination of $MgCO_3$ — "Medium Heat" — 1400 deg. F. and up.

(3) Sensible heat available for preheating of stone—"Low Heat."

(4) Heat unavailable to either—"Latent Heat."

As there is more low heat than there is stone to absorb it, part of it is certain to escape, and that is no fault of the kiln. It is really a lot to expect of a kiln not to use any of the higher heats for any of the lower purposes. For example, to expect that no heat higher than 1650 deg. be used for preheating of stone. If the stone were all in small sizes, say one inch, the expectation would be more reasonable, but when stone is 6 or 7 in. in minimum dimension, the medium or high heat that calcines the out-

side, also preheats the inside. Then while the outside, which is exposed to kiln atmosphere of around 30 percent $CO_2$ starts dissociating at 1515 deg. F., the inside has a higher $CO_2$ concentration up to 100 percent $CO_2$, at which dissociation takes place at 1650 deg. F., provided there is no back pressure. So what should we take as the dividing point between calcination and preheating zones, 1515 deg. or 1650 deg. F.? To the writer, it seems the higher figure as most lime is dissociated at that level, but the theorist may counter by saying beginning is beginning, and 1515 deg. is what should count.

While we could take it easy and just arbitrarily assume that in the ideal kiln the terminal temperature is zero at the end of each zone, and temperature either 1650 or 1400, depending on whether it is the junction of the calcium and magnesium or beginning of magnesium zones, that would not be fully satisfying. If on the other hand, we are ambitious, we are in trouble, for we should know what is the temperature difference between the lime and the gas stream, and what it is through the lime and limestone. With that information we then could determine:

(a) How much heat of higher value is lost due to imperfection of external heat transfer.

(b) How much is lost due to resistance to internal heat transfer.

To determine all this is, to say the least, not only difficult but impossible, for there will be differences with different stone sizes and shapes and differences with different gas flow rates, also due to differences of exposure and packing of individual pieces.

We are in an even worse quandary when it comes to magnesium oxide. The magnesium carbonate of dolomite demands a lower temperature for dissociation and also requires less heat. This is readily taken care of, but as magnesium carbonate dissociates 250 deg. F. lower than calcium carbonate, much of it dissociates before calcium carbonate begins to dissociate. Therefore, much of the magnesium carbonate is calcined with waste heat from the calcium carbonate calcining portion of the kiln. To calculate efficiency of a kiln calcining dolomite as we would a high calcium limestone kiln by mere heat requirement, as the formula given at the beginning demands, would favor the dolomite kiln unduly to the disadvantage of the high calcium limestone kiln.

The question next is how to make the adjustment; that is to determine how much of the magnesium carbonate portion is calcined with medium heat of between 1400 deg. F. and 1650 deg. F. and how much slips by into the higher section and is there calcined with heat over 1650 deg. F., which otherwise would have been used for dissociating calcium carbonate.

### Heat Losses

The next problem is what is the heat capacity of the products of combustion plus the $CO_2$ from the lime leaving the calcium carbonate and entering the magnesium carbonate portion of the kiln. Of the heat in the products of combustion, we can be sure, in the theoretical kiln anyway, but that is not the case of heat in the $CO_2$ from the stone, because it is quite complex to determine the amount of $CO_2$, that is lime that will be made.

The theoretical ideal, of course, puts out lime at the same temperature as the air that enters the cooler; and the heat from the cooler returns to the hot zone to make lime. But lime in the cooler is not just lime of an equal heat capacity. Core brings heat into the cooler and that heat later makes some lime. Magnesium oxide has a much higher specific heat than calcium oxide and is therefore an important converter of low heat in the preheating zone into high heat, for which a good term would be "regenerative effect."

Then there are the impurities, which also must be considered. With impure limestones surprisingly high ratios are often obtained, but that does not make the kilns any more efficient—calculating the efficiency in a manner that would take everything into consideration would show that up quickly.

Taking silica for example, any given amount reduces the carbonate by an equal amount, and the heat required for calcination is reduced proportionately. Then the silica combines with the lime and that is a heat generating reaction. In addition, the silica absorbed some low heat in the stone preheater, and that heat is delivered in the cooler and from there returns to the calcination zone to serve as high heat in making the lime.

A study indicates that the heat of combination of silica with lime is about proportional to the amount of silica regardless of the kind of combination it enters into. In all, the reduction of heat requirement in lime kilns for each percent of silica in lime will be about 27 B.t.u., consisting of these separate items.

| | B.t.u. |
|---|---|
| Reduction in heat of dissociation through displacement | 13.8 |
| Heat of combination (formation of calcium silicates) | 9.5 |
| Regenerative effect (heat reversion by cooler) | 3.9 |
| Total | 27.2 |

So each percent of silica in lime reduces fuel requirements about 2 percent, and with alumina and iron the same would apply although quantitatively different. But while the fuel requirement is reduced, that does not mean that efficiency is increased and that a high ratio lime kiln burning impure stone may be little more efficient than a low ratio lime kiln burning pure stone, contrary to appearances. That it is a little more efficient is due to the regenerative effect.

To obtain the many factors necessary is not simple. The figure given herewith only gives part of the information, and heats of reaction and specific heats of the various substances that enter into consideration must be those at high temperatures prevailing in the kiln.

The question is this: Is it important to determine efficiency so precisely? Yes, and very much so, because the kilns are reaching toward the limit, and so we should know exactly what the limit is. On available heat basis some kilns operate now with an efficiency in excess of 80 percent and are still reaching upward. Considering that about 10 percent of the remaining heat is radiation loss counted as avoidable but to a great extent unavoidable, there is not much waste heat left to work on; only about 10 percent.

Five thousand cubic feet of 1000 B.t.u. natural gas means an efficiency of 75 percent, on available heat basis, and only 55 percent when calculated on total heat basis. As anything with an efficiency of 75 percent, is not bad, when only 55 percent it is and, since it is not the kiln's or operator's fault.

## Lime-Oil Cracking Patent Allowed

THE COURT OF CUSTOMS and Patent Appeals has allowed the broad patent No. 2,167,211, containing 29 claims, to U. S. Jenkins, assignor to Jenkins Petroleum Products Co., Chicago. Claims of the patent broadly cover use of a finely divided mineral adsorbent toward carbon and/or carbon-forming substance in a cracking cycle, while others are specific to use of finely-divided lime in a body or stream of oil subjected to cracking conditions. The Standard Oil Co. of Indiana, one of the large users of lime in cracking, has taken a license under the patent.

# How Much Does It Cost?

**Flexibility of this accounting system is one of its main features. Final installment discusses monthly reports of operation and production cost sheets**

By KELSEY D. HOWINGTON*

AT THE END OF EACH MONTH an operating statement with production cost sheets, as shown by exhibits 31, 32 and 33, is made up. It can be seen that the production cost sheets are made up directly from the material and labor costs distribution sheets, as shown in exhibit 8. A summary sheet in the back of the sales record book gives the required additional figures for the operating statement other than those coming from the plant records already discussed.

In the first article of the series, appearing in ROCK PRODUCTS, September, p. 23, there was published a flow sheet of accounting operations to which the reader may refer to secure a better picture of the monthly statements and production cost sheets illustrated and described herewith.

STOCK PILE INVENTORY: The stock pile inventory report is made up at the end of the month, after the complete production and shipment figures have been compiled, by a physical inspection of the stock piles.

BRICK REPORT: A granite concrete brick operating statement, as shown by exhibit 34, is prepared from the figures shown by exhibit 9. The average figures for this report can be kept on a regular columnar pad by adding each month's production and sales figures to the totals for the previous months of the year. The stock pile inventory figures are obtained by a physical inventory by the brick foreman at the end of each month.

*Assistant Treasurer, Consolidated Quarries Corp., Lithonia, Ga. Mr. Howington has been with the company since 1928, and acquired the degrees of L.L.B. and C.P.A. in his spare time.

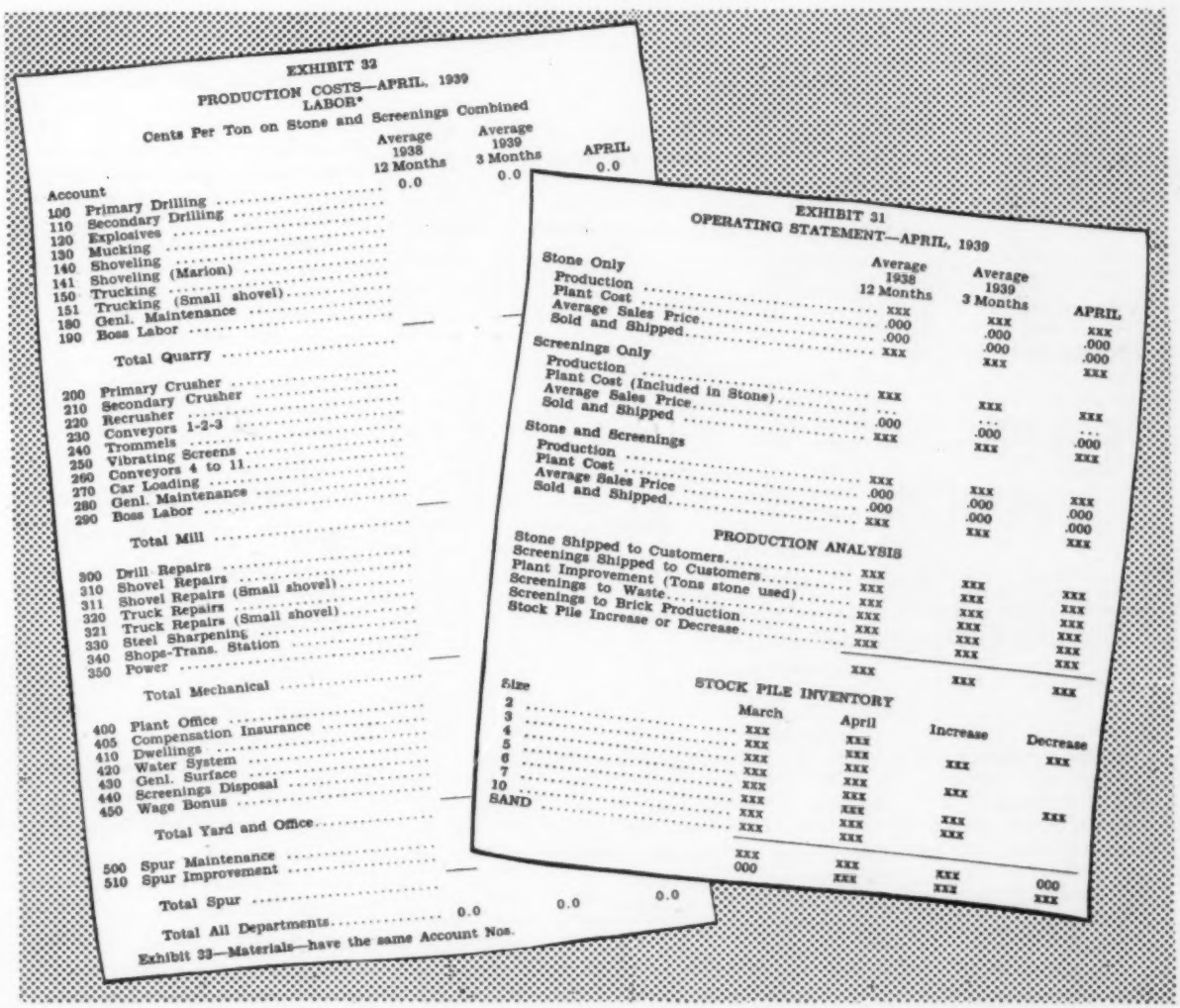


EXHIBIT 32

PRODUCTION COSTS—APRIL, 1939

LABOR*

Cents Per Ton on Stone and Screenings Combined

| Account | | Average 1938 12 Months | Average 1939 3 Months | APRIL |
|---|---|---|---|---|
| 100 | Primary Drilling | 0.0 | 0.0 | 0.0 |
| 110 | Secondary Drilling | | | |
| 120 | Explosives | | | |
| 130 | Mucking | | | |
| 140 | Shoveling | | | |
| 141 | Shoveling (Marion) | | | |
| 150 | Trucking | | | |
| 151 | Trucking (Small shovel) | | | |
| 180 | Genl. Maintenance | | | |
| 190 | Boss Labor | | | |
| | Total Quarry | | | |
| 200 | Primary Crusher | | | |
| 210 | Secondary Crusher | | | |
| 220 | Recrusher | | | |
| 230 | Conveyors 1-2-3 | | | |
| 240 | Trommels | | | |
| 250 | Vibrating Screens | | | |
| 260 | Conveyors 4 to 11 | | | |
| 270 | Car Loading | | | |
| 280 | Genl. Maintenance | | | |
| 290 | Boss Labor | | | |
| | Total Mill | | | |
| 300 | Drill Repairs | | | |
| 310 | Shovel Repairs | | | |
| 311 | Shovel Repairs (Small shovel) | | | |
| 320 | Truck Repairs | | | |
| 321 | Truck Repairs (Small shovel) | | | |
| 330 | Steel Sharpening | | | |
| 340 | Shops-Trans. Station | | | |
| 350 | Power | | | |
| | Total Mechanical | | | |
| 400 | Plant Office | | | |
| 405 | Compensation Insurance | | | |
| 410 | Dwellings | | | |
| 420 | Water System | | | |
| 430 | Genl. Surface | | | |
| 440 | Screenings Disposal | | | |
| 450 | Wage Bonus | | | |
| | Total Yard and Office | | | |
| 500 | Spur Maintenance | | | |
| 510 | Spur Improvement | | | |
| | Total Spur | | | |
| | Total All Departments | 0.0 | 0.0 | 0.0 |

Exhibit 33—Materials—have the same Account Nos.

EXHIBIT 31

OPERATING STATEMENT—APRIL, 1939

| | Average 1938 12 Months | Average 1939 3 Months | APRIL |
|---|---|---|---|
| **Stone Only** | | | |
| Production | xxx | xxx | xxx |
| Plant Cost | .000 | .000 | .000 |
| Average Sales Price | .000 | .000 | .000 |
| Sold and Shipped | xxx | xxx | xxx |
| **Screenings Only** | | | |
| Production | xxx | | |
| Plant Cost (Included in Stone) | ... | xxx | xxx |
| Average Sales Price | .000 | ... | ... |
| Sold and Shipped | xxx | .000 | .000 |
| **Stone and Screenings** | | xxx | xxx |
| Production | xxx | xxx | xxx |
| Plant Cost | .000 | .000 | .000 |
| Average Sales Price | .000 | .000 | .000 |
| Sold and Shipped | xxx | xxx | xxx |
| **PRODUCTION ANALYSIS** | | | |
| Stone Shipped to Customers | xxx | xxx | xxx |
| Screenings Shipped to Customers | xxx | xxx | xxx |
| Plant Improvement (Tons stone used) | xxx | xxx | xxx |
| Screenings to Waste | xxx | xxx | xxx |
| Screenings to Brick Production | xxx | xxx | xxx |
| Stock Pile Increase or Decrease | xxx | xxx | xxx |
| | xxx | xxx | xxx |

**STOCK PILE INVENTORY**

| Size | March | April | Increase | Decrease |
|---|---|---|---|---|
| 2 | xxx | xxx | | |
| 3 | xxx | xxx | xxx | xxx |
| 4 | xxx | xxx | | |
| 5 | xxx | xxx | xxx | |
| 6 | xxx | xxx | | |
| 7 | xxx | xxx | xxx | xxx |
| 10 | xxx | xxx | | |
| SAND | xxx | xxx | xxx | |
| | xxx | xxx | xxx | 000 |
| | 000 | xxx | xxx | xxx |

EXHIBIT 34

GRANITE CONCRETE BRICK

OPERATING STATEMENT—APRIL, 1939

| Summary | Average 1938 12 Months | Average 1939 3 Months | APRIL |
|---|---|---|---|
| Production | xxx | xxx | xxx |
| Plant Cost | 0.0 | 0.0 | 0.0 |
| Average Sales Price | 0.0 | 0.0 | 0.0 |
| Sold and Shipped | xxx | xxx | xxx |
| **Production Analysis** | | | |
| Shipped to Customers | xxx | xxx | xxx |
| Plant Improvement | xxx | xxx | xxx |
| Stock Pile Increase or Decrease | xxx | xxx | xxx |
| **Cost Statement—Labor** | | | |
| 800 Raw Materials | .0 | .0 | .0 |
| 810 Manufacturing | | | |
| 820 Repairs | | | |
| 830 Glazing | | | |
| 840 General | | | |
| **Material** | | | |
| 800 Raw Materials | | | |
| 810 Manufacturing | | | |
| 820 Repairs | | | |
| 830 Glazing | | | |
| 840 General | | | |

Stock Pile Inventory

| | MARCH | APRIL | INCREASE | DECREASE |
|---|---|---|---|---|
| Singles | xxx | xxx | xxx | |
| Doubles as Singles | xxx | xxx | | xxx |
| Triples as Singles | xxx | xxx | | |
| | xxx | xxx | xxx | xxx |

EXHIBIT 35

ROCK CHAPEL

REVIEW OF OPERATIONS—APRIL, 1939

| | |
|---|---|
| Operating Days in Month | xx |
| Days Operated | xx |
| Days Down Acct. weather | x |
| Hours recrushing | xx |

MAJOR OPERATING DELAYS

| | | | | | |
|---|---|---|---|---|---|
| Bucyrus Shovel | Mechanical | 1 | Hr. | 30 | Min. |
| Primary Crusher | Rocks Hung | x | " | x | " |
| Mill | Electrical | x | " | x | " |
| Marion Shovel | | x | " | x | " |

Lost Time Accidents—None.

| Results | Average 1938 12 Months | Average 1939 3 Months | APRIL |
|---|---|---|---|
| Total Tons Crushed | xxx | xxx | xxx |
| Tons Crushed per attempted Operating Hour | xxx | xxx | xxx |
| Total Tons Shipped | xxx | xxx | xxx |
| Total Man Hours | xxx | xxx | xxx |
| Man Hours per Ton Crushed | xxx | xxx | xxx |
| Feet Blast Hole Drilled | xxx | xxx | xxx |

QUARRY

| | |
|---|---|
| Broken Stone on Hand April 1st (in quarry) | xxx |
| Stone Broken During Month | xxx |
| Stone Used During Month | xxx |
| On Hand April 30th | xxx |
| Tonnage Drilled April 30th (by well drill) | xxx |

REMARKS

EXHIBIT 36

MAJOR ITEMS MATERIAL USED OR INSTALLED DURING MONTH OF APRIL, 1939

| Acct. | Date | Machine | Item | Cost |
|---|---|---|---|---|
| 100 | 7 | Well Drill | Drive Belt | xxx |
| 210 | 10 | Secondary Crusher | Reboring Eccentric | xxx |
| 311 | 1 | Marion Shovel | Bolt Steel | xxx |
| 400 | 11 | Office | Stationery | xxx |
| 500 | Month | Spur Track | Maintenance | xxx |
| | Total | | | xxx |

REVIEW OF OPERATIONS REPORT: A note is made at the bottom of the daily report of production and sales, as shown by exhibit 30, of any major delays and the reasons therefor. Each foreman is required to send in a memorandum daily covering any delays in that department. At the end of the month these figures are compiled and furnish the figures for the major operating section of the review of operations report, shown by exhibit 35. It will be seen that the other data for this report can easily be obtained from the records already discussed. A second sheet of this review of operations report is a statement of major items material used or installed during the month, as shown by exhibit 36. This report is made up by going over the daily summaries of material used, made up daily by the warehouseman, and noting any large items.

### Conclusion

Practically all of the system described has been in use for some ten years at the present plant, but it has always been open to improvement by the adoption of any new time saving methods, provided they are adaptable and adequate. Office equipment consists only of an adding machine and typewriters, but as stated in an early paragraph, we make extensive use of the slide rule. All unit costs (cents per ton), both on the daily costs report and the monthly material and labor distribution sheets, are figured by the slide rule to the nearest third place. We have found this quite adequate for the purpose and it not only is a time saver, but avoids the purchase of expensive office machines which would not be justified for the size of this organization.

### EDITOR'S NOTE

**This is the concluding installment of a series of three articles which started with the September issue of ROCK PRODUCTS. These articles describe a comprehensive accounting system which is designed to give every essential cost detail without the necessity of maintaining a large accounting staff. The articles also have stimulated an interest in the subject of a uniform accounting system for the crushed stone industry.**

# Research In Road Materials

**Type of crusher, rate of feed, reduction ratio, and condition of crusher jaws affects shape and grading**

AUTHORS of the British paper* by (A. H. D. Markwick, A. R. Lee and W. C. Glanville) have confined themselves to two aspects of the subject; first, problems concerned with the variability of aggregates and, second, problems connected with surface dressing of bituminous surfaces. They emphasize the desirability of writing specifications which are neither so narrow that they will inflict hardship on the producer, nor so wide that they will be meaningless so far as insuring uniform construction is concerned.

For many centuries the importance of proper gradation in road materials has been realized, but, today, more exact methods for determining size are available. These methods, however, are not alike, nor is their precision uniform with various kinds and sizes of materials. There are variations in grading due to the methods used for determining grading. It is also pointed out that variations in grading will occur from shipment to shipment, and that also they will exist in a single shipment. Such variations make it hard to insist upon rigid compliance with any specification. Variability in grading and also in the shape of particle affects, not only the surface area covered by a given quantity of chips, but likewise the thickness of the cover is affected. Necessarily, also, imperfection in the grading will be reflected in the properties of the resulting bituminous surface treatment. Sometimes there is an excess of binder and at others a deficiency. Hence, it becomes important to study the effects of gradation on the resulting characteristics of the surface.

It is pointed out that variations in test results are of two types. In the first place, there is the apparent variability of the material arising from limitations in sampling and grading which may result in even a uniform material appearing to be variable and, secondly, there is true variability in the grading due to segregation and methods of production, or other reasons. The factors influencing the apparent variability are variations in size of sieve apertures, personal variation in sieving between different operators, and variability due to errors of random sampling. True variability may be due to the type of rock, the methods employed for crushing and screening and to segregation and other causes.

### Apparent Variability

Standards set up for controlling the size of opening in testing sieves permit tolerances in the average size of sieve aperture. These tolerances range from 2 percent in the larger sizes to 8 percent in the smaller sizes such as the No. 200 sieve. These tolerances are permitted by British Standard No. 410 (1931). The A.S.T.M. standard permits tolerances in average opening varying from 3 percent to 8 percent, the 3 percent applying to the No. 4 sieve and the 8 percent to the No. 200 sieve. It is thus apparent that two sieves, both complying with standard requirements, might give somewhat different results and it is shown by the authors by actual tests that different results are obtained.

**CHEMIST'S CORNER**

**Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited.**

One of the illustrations given applies to one-half inch chips which are supposed to be graded as follows:

Retained on ½-in sieve.....10 percent
Passing ½-in. and retained on ⅜-in. .....65 percent

A tolerance of ± 3 percent is permitted on the average sieve opening in both the ½-in. and ⅜-in. sieves. Because of this tolerance, the percentage of material retained on ½-in. as determined with sieves having an extreme range of tolerance would be 6.5 to 14.8 percent instead of the required 10 percent and the percentage of the ½- to ⅜-in. material, instead of being 65 percent would be from 54.3 to 73.8 percent, a range of ± 9 percent from the requirement of 65 percent. The ordinary standard sieve is not a very accurate piece of apparatus and the necessity for large tolerances in sieving requirements, for this reason alone, becomes quite apparent.

### Variations in Sieving

It is pointed out that different operators obtain different results. This is quite in agreement with our own experiences. One of the difficulties seems to be to determine when the end point of sieving is reached. According to the authors one of the best methods is to specify that the sieving must be continued until the weight of material passing the sieve in one minute is only a trace. The error due to methods of sieving is, however, small in comparison with other errors.

It is stated that errors due to sampling are inherent in all methods of sampling granular material. Methods of calculation for percentage of error are shown and are applied to a sample of ½-in stone having the following gradation:

Retained on ½-in. .....15 percent
Passing ½-in. and retained on ⅜-in. .....65 percent
Passing ⅜-in. .....20 percent

It is shown that if 100 samples of the above material, each weighing 14 lb. are taken, 62 of the samples will have a percentage of oversize greater than 15.45 percent or less than 14.55 percent; while 32 will contain oversize greater than 15.09 percent, or less than 14.1 percent. In comment, it might be said that one of the difficulties of random sampling is to be found more in the extremely great variation in aggregate as they are loaded. Segregation is, by all odds, the biggest factor in variation in test results.

It is commonly supposed that the type of rock has an important effect on the 'fracture pattern,' i. e., the grading and shape, when the stone is crushed and that this influence extends to the material even after screening." According to the authors there is good reason to think that this opinion is mistaken.

It is indicated that the type of crusher will greatly affect the shape and grading of the product as will also the rate of feed, the reduction ratio and the condition of the crusher jaws.

Factors which affect the grading of

* Abstracted from **Chemistry and Industry**, Vol. 58, No. 7 (Feb. 18, 1939), pp. 131-143, by A. T. Goldbeck, Engineering director, National Crushed Stone Association.

crushed material include variations in the initial grading which will also affect the screening efficiency. The shape of the stone affects the ease with which it will pass through the screen, but the principal effect is the rate of feed through the screen.

### Surface Dressing

The authors discuss several phases of surface dressing, or surface treatment as we call it in the United States. The factors which make for variation in the final results are the characteristics and quantity of binder used, the temperature, the quality, size, shape and rate of spread of the stone chips. These various factors must be adjusted to suit the condition of the road surface to traffic conditions and the climatic conditions of the particular road concerned. The binder, or bituminous material, should have a viscosity sufficiently low to permit it to be applied to the road surface in a thin film without excessive heating and, of course, its function is to adhere to the surface and to the applied chips. The viscosity of the binder may vary within rather wide limits and still be satisfactory. A table is given showing what the authors feel is a proper correlation between the size of the chips and the rate of spread of tar:

| SIZE OF CHIPPINGS | RATE OF SPREAD |
|---|---|
| ⅜ in. | 4½ sq. yd. per gal. |
| ½ in. | 5 sq. yd. per gal. |
| ⅝ in. | 5½ sq. yd. per gal. |
| ¼ in. | 7-9 sq. yd. per gal. |

In discussing the rate of application of stone chips and quoting from a recent book by Hughes, Adam and China, it is stated that the correct rate of spread is as follows:

| SIZE OF STONE | RATE OF APPLICATION |
|---|---|
| ¾ in. | 70- 80 sq. yd. per ton |
| ½ in. | 90-100 sq. yd. per ton |
| ⅜ in. | 110-120 sq yd. per ton |
| ¼ in. | 140-170 sq. yd. per ton |

"The necessary rate of application of the stone may readily be determined in the laboratory by the simple experiment of laying the stones shoulder to shoulder on a tray about a foot square and weighing the amount to cover the trap. It is necessary to use 5% to 10% more chips than is given by the laboratory test to allow for inequality in the rate of spread." The above method of test has been found to be satisfactory for determining the amount of chips to use. Such a method of control is necessary as the covering capacity varies with the size, shape and grading of the stone and in some cases the covering capacity of a flakey stone may be greater than that of a smaller size which is cubical in shape. It has been found that the covering power varies inversely as the size of the chippings and inversely as the effective thickness of the stone. A table is given showing the effect of grading, size and shape on the covering power of two stones, each having different percentages of flaky material.

EFFECT OF SIZE AND SHAPE OF CHIPPINGS ON THE RATE OF APPLICATION OF THE MATERIAL (SQ. YD. PER TON)*

| Nominal size | Oversize | Grading Specified size | Rate of application sq. yd. per ton Percentage flakey material** 10 | 20 | 40 | 60 |
|---|---|---|---|---|---|---|
| ¾-in. | 10 | 70 | 74 | 79 | 92 | 108 |
| | | 50 | 80 | 86 | 99 | 117 |
| ½-in. | 10 | 70 | 105 | 113 | 131 | 153 |
| | | 50 | 113 | 121 | 140 | 165 |

*For an aggregate of specific gravity 2.60. The figures include an allowance of 5% of chipping over the laboratory covering power.

**The percentage of flakey material was determined by B. S. 812. Testing of Aggregates, Sands and Fillers. Method 2.

## Producing Sand for Glass

*(Continued from page 30)*

bearings, and is driven off the elevator head shaft. It rocks back and forth, alternately spilling into the two spouts that put the material into each end of the mill.

Within the mill the water content is kept at about 80 percent to get material through the mill fairly fast. The circulating load is about 300 percent, which means that four times the fresh feed is entering the ball mill. Keeping this load on the mill eliminates excessive grinding and wear that would result if the feed were kept down. What is wanted is a product all under 40-mesh for glass manufacture but without too much fines.

With this circuit, the ball mill discharge is split equally into the two revolving screens. Plus 40-mesh sand flows into the boot of the bucket elevator, which returns it into the mill, and the throughs flow into a sump. A 4-in. Allen-Sherman-Hoff "Hydroseal" rubber-lined pump lifts the fines into the same surge box near the drain bins which receives unmilled sand from the screens. The six drain bins each hold about 200 tons. Overflow from the rake classifiers, containing practically all the minus 150-mesh silt, etc., is laundered to a Dorr thickener. Underflow from the thickener is wasted while the overflow is clarified in settling ponds. The water is re-used.

Glass sand is all dried before the final screening operation. After drying, some of it which is to be used in manufacturing high grades of glass is put through the acid treatment plant to leach out iron oxide. Jeffrey-Traylor No. 4 vibrating feeders at the drain bins feed sand out to a reclaiming belt conveyor, which transfers the sand into a bucket elevator, from which it is chuted to a 5- x 31-ft. Stockton gas-fired, rotary dryer. Feed from the drain bins is regulated to maintain a sand discharge temperature of 250- to 300 deg. F. A Sturtevant No. 55 blower provides the draft, exhausting through a Western Precipitation Corp. 20-tube Multiclone dust collector.

### Unusual Vibrating Conveyor

Dried sand can discharge either of two ways. An inclined, totally enclosed screw conveyor leading into an enclosed bucket elevator to the acid plant is one way, the other is by way of a vibrating conveyor discharging into a bucket elevator and then into bins ready for dry screening. Dust may be returned into either system.

The vibrating conveyor consists of a 45-ft. section of 14-in. diameter steel pipe hanging beneath the dryer, with seven Jeffrey-Traylor electromagnetic vibrators attached to move the material inside. Vibration applied at a 20 deg. angle to the pipe axis moves the dry sand up a 6 to 7 deg. rise into the elevator. In regular service the pipe lasts five years, eventually being displaced because of corrosion and not abrasion. Belt life had been short and screw conveyor spirals had a tendency to warp in this service. Dryer capacity is 40 to 50 tons per hour. That fraction of the output which is acid-leached is washed, drained and returned into the dryer to be dry screened later over a 3½- x 8-ft. Robins double-deck vibrating screen, the products of which are sent to bins. Practically all the output is shipped in box cars loaded by a Stephens-Adamson portable box car loader.

Molding sands are produced from part of the original feed by the proper adjustment of the cloth on the screens, sending the rejects into the ball mill and passing the fines into sand settling tanks. The feed flows by gravity into a 5-ft. Allen cone which discharges continuously into a Deister sand tank just below it. By having two settling tanks, variability in the rising currents due to irregular feed are compensated for. Excess fines are wasted from the cone overflow and the dewatered sand enters the second machine, where hydraulic water is added. Product of the second machine drops into a bin.

Stanley Peddler is president of Silica Co. of California, Ltd.; K. G. Schwegler, vice-president and general manager; R. D. Carmiencke, secretary; and Charles Eckland, treasurer. J. Krill is superintendent of the plant.

# Building Construction Prospects*

By MELVIN H. BAKER
President, National Gypsum Co.

Melvin H. Baker

THE PRESENT UPTURN in building came from a sound demand that resulted through a ten-year drought in the construction industry. A shortage of housing and a knowledge that building cost was not high started renewed interest in the building field last spring. Following this upturn we approached the European war in September with a sound demand and the curve moving upward. This was just the opposite from conditions that existed in 1914.

Here we are almost three months after war started, and no effect on building except for a slight stiffening in prices. It has been pointed out that in 1914 building activity was moving into a downward cycle, whereas in this war we find the industry coming out of a long depression period. To support this current trend, there is a potential demand made tremendous by ten years' growth in population, destruction, deterioration and obsolescence. And, in this connection, it must be borne in mind the construction industry is operating less than 50 percent of 1926, with annual requirements substantially greater than they were in 1926.

The consensus of our people and the business interests is to keep this country out of the war. Assuming we do not get into the war, any effect of Europe's problems will encourage building in this country.

Larger payrolls to support greater production would just naturally result in immediate need for more and better housing. The effect would be an advance in rents and property values, needed to attract private capital to the building field.

Aside from residential building, reduction in unemployment would make more buying power that would direct capital to commercial and industrial building. In this connection we must not overlook the fact that for every dollar invested in building, about 65 cents goes directly and indirectly to labor. So that any substantial increase in building creates buying power that will in itself stimulate more building.

We have here a potential annual business of about ten billion dollars, including construction, furnishings and equipment. This contains a prospective income of about $6,500,000,000 for labor, which when released might easily create a boom for every man's business.

To the extent that war contributes to our industrial activity, it should influence more building. There is, however, a grave danger of curtailment through too rapid increase in cost. Let us explore more fully this danger.

The building material business is highly competitive and materials are fairly well standardized. Consequently, it would be difficult for any group to sell at unreasonable prices. Well informed management in all branches of the industry will, I believe, look for profits from larger production. That this policy has been the practice is shown by the fact that material prices are now 10 percent less than they were in 1926.

Wages are much higher than in 1926, but production has been engineered to larger output per man to permit profit without increasing prices. In many cases the opportunity for mass production has been exhausted, and further advances in labor rates will make necessary some advance in materials.

With modern manufacturing methods labor is a comparatively small item in product cost. But the total labor bill for construction, servicing and product production amounts to around 65 percent of present building costs. When analyzed from this standpoint labor is by far the most important item to consider.

Producers can not control the building trades. This is in the hands of our labor leaders. Jurisdictional disputes arising from the arbitrary attitude of the building crafts have been costly. I know that labor officials are working on this problem and feel that important organization changes now being considered will alleviate that situation. High rates for short hours and expensive overtime have contributed to high costs.

I don't think we need war business from which to develop our own economy. We do need an improvement in industry to make available more capital for building. Regardless of how war purchases may stimulate activity for our industries, we will still have a need for more building, which will come with any improvement in general business.

Finally, this industry must face the problem of attracting to it new capital. Any discussion of this involves the whole philosophy of those who are planning our system of economy. And, regardless of the war, those economic forces directly affecting construction should have our continuous attention. I have reference to such deterring elements as:

(1) Local property taxes and the whole method of taxation by State and Federal Government for reform instead of for income.

(2) The present capital gain and loss tax, which acts to discourage a shift of capital from present investments to provide cash for new ventures in the building field.

(3) Restrictions to securing new capital, as now provided under regulations of the Securities and Exchange Commission.

(4) Direct Government competition in the building field through its many bureaus, such as W.P.A.; U.S.H.A., utilities and others too numerous to mention.

(5) Acts of the Government in spying on industry, penalizing the whole industry for the evils of a few, such as is now being done by the Federal Bureau of Investigation in the building field.

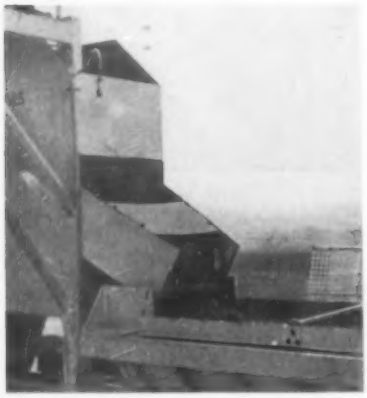
*Abstract of a paper read November 17, 1939, at Construction Industries Conference, Chamber of Commerce of the United States.

# Hints and Helps

## ★ FOR SUPERINTENDENTS ★

### Feed Chute Which Prevents Wear

THE ACCOMPANYING ILLUSTRATION shows to what extent a practical plant operator has gone to feed crushed gravel properly to a vibrating screen. This is one of several similar chute arrangements used in the new plant of Graham Bros., Inc., at El Monte, Calif. A considerable portion



Chute reduces wear on vibrating screen

of the lower end volume of the chute contains material which does not flow out but is effective in preventing wear. Let stone wear on stone wherever possible is the theory back of this arrangement. As a feeder, the tendency is to spread stone uniformly over the screen width which promotes efficiency.

### Getting More Wear Out of Dredge Pipe

SAND AND GRAVEL passing through dredge pipe causes severe wear at the bottom of the inside of the pipe. At Fort Peck dam at the end of each season, the pipe was turned part way to place an unworn section in the bottom position, thereby greatly increasing the life of the pipe.

However, after one short season and four long seasons of dredging, finding unworn sections of pipe became more difficult and patching and "half-soling" of the pipe became necessary. "Half-soles" are curved sheets of steel $\frac{3}{8}$ in. thick and 24 in. wide which fit snugly on the outside surface of the pipe and are welded in place by arc-welding methods. This work was done by hand at the government's welding shop or in the field.

Two methods of determining the thickness of the worn pipe were used. In the first method, the wall of the pipe is struck with a ball-peen hammer, and the depth of any indentation is measured. The depth of the indentation determines the thickness of the pipe according to a curve which has been prepared from the results of measuring depths of indentations and drilling pipe to measure actual thickness. The accuracy of the test depends to a large extent upon the ability of the test man to strike each hammer blow with the same force, and the men soon become experts in this work.

The second method of testing makes use of a large pair of calipers by which the thickness of the pipe wall near the ends of the pipe may be measured directly. This method, of course, assures greater accuracy.

### Recording Ammeter Checks Delays

GRAHAM BROS., INC., LOS Angeles, Calif., at its new plant near El Monte, is endeavoring to get at the causes for delays in production by checking incoming tonnages of aggregates from a field hopper to the primary crusher with the screening plant output. This plant has a capacity of 400 tons per hour using large earth movers for excavation, with a belt conveyor feed from a field hopper to the primary crusher.

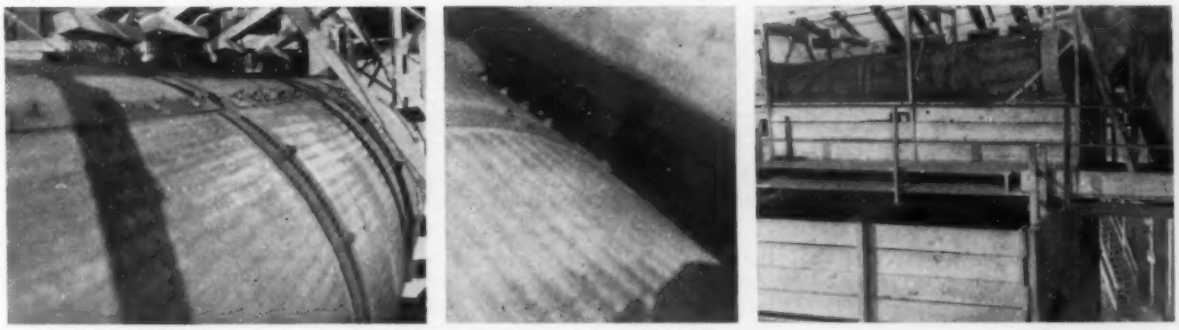
A Westinghouse continuous recording ammeter is connected into the conveyor electrical drive to record delays positively, their duration and the time of occurrence. At the head of the conveyor where it dumps over a scalping screen just ahead of the primary crusher, occasional checks are made on the belt tonnages by diverting the flow from the screen to a steel chute which loads into trucks. Weighing the trucks gives a positive check on how much material is handled. The plant operator reports delays in his part of the plant. By using checks such as these, delays in operation have been reduced from about 21 percent to three precent.

### Intermixing Sand With Screw Conveyors

JOHN D. GREGG, Roscoe, Calif., produces an unwashed plaster sand, dry screening a minus $\frac{1}{4}$-in. feed scalped from the main plant trommel screen. The operation is done through a 4- x 12-ft. revolving screen mounted directly over a steel bin which loads out to trucks. In place of a belt conveyor to carry the plaster sand (minus $\frac{3}{32}$-in. throughs) to storage, a hopper tapering down to a screw conveyor in the bottom is the means of intermixing the sand, which otherwise would vary in size as it comes through the screen openings.

Extending the length of the screen, a 12-in. screw conveyor, with right-hand flights for half its length and left-hand for the rest, is in the throat of the hopper—also the length of the screen. Driven off the gear reducer driving the screen, all the material is

Showing bypass chute where material is diverted to trucks for checking belt tonnages. Normally all material goes over screen with oversize passing to crusher



Left: Revolving screen to make unwashed plaster sand. Note brushes to clean out screen mesh. Center: Screw conveyor with right and left hand spirals, in hopper below revolving screen to prevent segregation. Right: Revolving screen for plaster sand. Screw empties sand into hopper below

gathered toward the center of the hopper, and discharges into the bin, all uniformly mixed.

## Rake Classifiers Mounted on Track

SILICA CO. OF CALIFORNIA, LTD., Brentwood, Calif., uses rail-mounted Dorr rake classifiers for washing and de-watering silica sand. The rails are laid over the tops of a single row of open-top bins, and the feed is taken from an enclosed flume to which flexible couplings are connected.

To facilitate moving the rake-cars short distances, the car mover shown has been developed. It consists of an old automobile differential attached to one end of the axle and a crank fitted in where the car drive shaft would normally be. A few turns of the

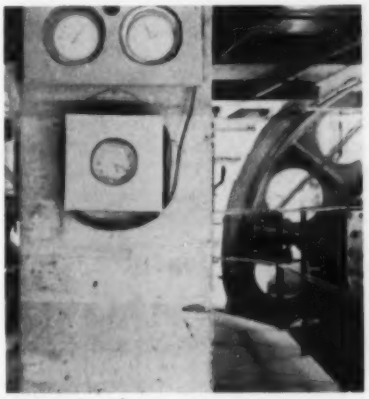
Use old automobile differential as hand operated car mover

crank saves a lot of manual labor. The speed of movement is slow, which is desirable to spot the car accurately.

## Simple Check on Operating Hours

MILL OPERATING RECORDS are simplified at Yosemite Portland Cement Company's plant, Merced, Calif., by the use of General Electric clocks in circuit with the raw material and clinker grinding mills. Operating two 7- x 26-ft. Allis-Chalmers compeb mills in each department, an individual check is kept on each mill by continuous record of total hours operated for any period.

In each department there are three ordinary electric clocks and two General Electric "Time Meters". One electric clock and one time meter are connected in operating circuit to the clutch of each mill in each department. The fifth clock serves merely to



Time clocks (electric) keep a continuous record of clinker mill hours

keep accurate standard time. In operation the electric clock and time meter run only when the mill clutch is engaged. The time meter is sealed and can not be re-adjusted to zero so it gives a cumulative record of total hours operated by the mill. The meter's capacity is 9999.9 hours or 417 days of continuous operation. The electric clock connected to the circuit of the mill clutch, serves merely to give the shift operating time in exact hours and minutes.

Use of the clocks simplifies the mill men's work in case of a failure, since, when the mill starts up again, he knows at a glance the length of the interruption. The system also furnishes a check on mill performance. Interruptions to continuous mill operation are due either to mechanical or operating failures which can be easily segregated. The mill man, at the end of his shift, checks total operating hours and writes his explanation of the interruptions, if any, on his daily record.

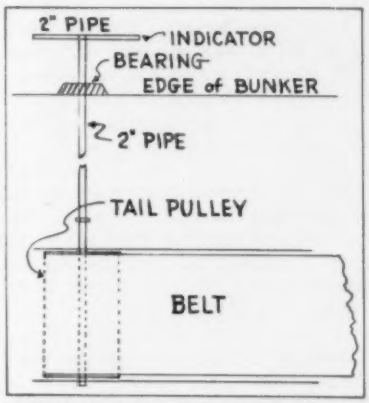
Hours and tenths, as recorded by each mill time-meter, are also continuously recorded, and are read the first and last days of each month by the superintendent for his monthly record.

## Conveyor Equipped With Indicator

By DARE PARIS

IN THE ACCOMPANYING ILLUSTRATION is shown a conveyor belt equipped with an indicator. This conveyor is operated under a set of screens in the top of the plant and can be seen only from the screen floor. In case the belt stopped and there was no one at hand to stop the feed, a great deal of damage could be done in mixing the different size material. Therefore a man had been required on this floor most of the time.

As shown in the sketch the indicator is operated off the tail pulley. A 2-in. pipe is used, running out over the side of the bunker, thus showing at all times that the conveyor is running. The indicator can be seen from the ground, the hoist house and anywhere about the plant; and has practically eliminated a man on this floor.




Indicating device to show that concealed belt conveyor is operating

# NEW MACHINERY * NEW EQUIPMENT

## Fastener for V-Belts

FLEXIBLE STEEL LACING Co., Chicago, Ill., has brought out a V-belt fastener under the trade name of Alligator which is designed for "B" "C" and "D" section V-belts. The use of the fastener, however, is limited to the cross woven fabric core V-belts that are now being made and should not be applied to cord belts.

In the past the use of V-belt has been limited to services where endless belts could be used, and it is claimed that this eliminated many possible applications of V-belts for services where an endless belt could not be put on the sheaves without dismantling the drive.

The fastener consists of two die-formed steel end plates, two bushings, the two-piece rocker pins, and special nails. The end plates are held onto the ends of the belt by specially formed flat nails. As the die-formed end plates are narrower than the belt, no metal comes in contact with the sheaves.

After each half of the fastener has been nailed to the belt a two-piece rocker pin is inserted through the bushing and link

## Combination Shovel and Dragline

LIMA LOCOMOTIVE WORKS, INC., Lima, Ohio, has brought out Type 1201 which is a fast operating, powerful combination shovel and dragline said to be particularly adaptable for quarry and strip mine work.

When equipped as a standard shovel, it carries a 30-ft. boom, 20-ft. dipper handle and a 3-cu. yd. bucket. For special work such as open-pit mines, the machine can be equipped with a 42-ft. boom, 32-ft. dipper handle and a 2½-cu. yd. dipper. The shovel boom and dipper handle are of box type design, electrically welded throughout.

Three levers and two foot pedals are all that are necessary to control the three major operations; hoist, swing and crowd. It is equipped with inside expanding clutches with housing cooled through radiation fins.

Shovel has crawler truck comprising a one-piece base casting

The hoist clutches are equipped with vacuum power assistors operating through toggles. which makes possible the lowering of load with the clutch engaged. Each major operation is independent of the other making it possible to hoist, travel, swing and raise or lower the boom simultaneously.

## Larger Capacity Truck Mixers

THE T. L. SMITH Co., Milwaukee, Wis., has announced the addition of 3, 4, and 5-cu. yd. sizes to their line of Smith-Mobile truck mixers and agitators.

Instead of a loading hatch, the new units are equipped with a large feed chute located at the high end of the drum. Since the drum revolves during the charging operation, shrinking and mixing begin as soon as the materials enter the drum. Water is introduced through the drum charging opening by a high pressure, turbine-type pump.

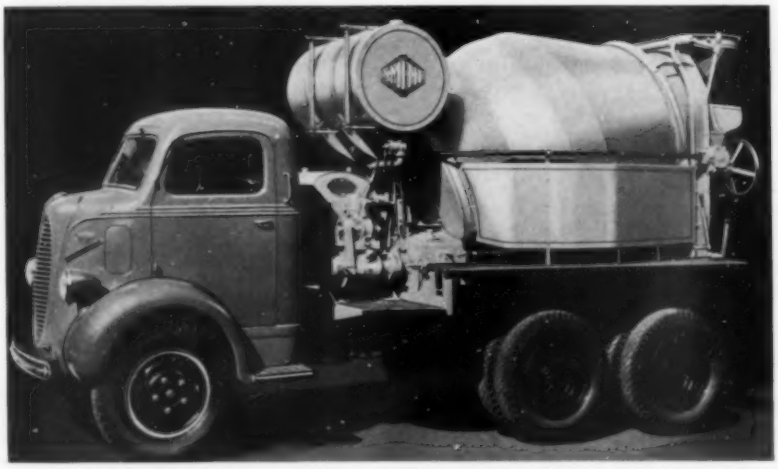
With a high discharge, a large radius of spout distribution is permitted which eliminates the need for ramps when concrete is discharged into hoppers or high forms. For discharging the batch, the operator merely reverses the direction of the drum. The operator can obtain either slow or fast discharge by operating the clutch lever.

## Primary Crusher with Anti-slab Jaws

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has developed a primary crusher with jaws designed to prevent a slabby product. Accord-

Wavy-shaped jaw of primary crusher designed to reduce amount of slabby product and increase life of jaw

ing to engineers of the company, the use of jaws in a primary crusher having either a flat crushing surface at the bottom of the jaw or having closely spaced corrugations has a tendency to produce a comparatively



Larger capacity truck mixer has two-piece swivel distributing chute

high percentage of slablike product when working on materials that have a laminated structure.

In the new design, the primary crusher jaw has a wavy shape rather than corrugated, the peak of the waves being spaced about 6 in. apart. It is said that the effect of this shape of jaw on the crushing operation is to subject the slab-type rock to a true breaking strain rather than to a squeezing pressure.

## Diesel Engines and Gold

CUMMINS ENGINE CO., Columbus, Ind., reports an interesting application of a diesel engine on a 3-cu. yd. Marion dragline for moving 200 cu. yd. of material per hour in a placer mining operation. The engine is a 200-hp. Model L, 6 cyl. Cummins. On the "floating plant" which receives the material from the dragline is a 100 kw. diesel generator which provides the power necessary to run the individual electric motors of the boats, winches and pumps.

The dragline dumps to a hopper on the "floating plant" which feeds to a trommel screen. Water, sand and gold through the screen goes to a series of flumes lined with a special heavy screen of expanded metal, similar to the material used as a base for a plaster coat, but heavier. Rejected rock in the trommel is chuted to a tailings pile. Below the stationary expanded metal screen are old carpets, and quicksilver for amalgamation with the gold is poured in each of the "pockets" formed by the screen. After the water and sand passes over the screens,

Diesel-powered 3-cu. yd. dragline moving 200 cu. yd. of material per hour

it continues to wash over a series of "Hungarian" riffles which extend lengthwise on the boat to the back end where it is expelled. A final bail box is placed at the end to the riffles to catch any run-away quick-silver.

After certain periods, the screens are lifted and the rugs which hold the gold amalgam are washed off into buckets. The material is then washed again to rid it of any sand and put into a flour sack or similar porous cloth container. When the sack is squeezed the free quicksilver passes through the cloth leaving the gold and quicksilver amalgamation behind.

## Wire Rope Sling Protects Workmen's Hands

MACWHYTE CO., Kenosha, Wis., has developed an improved loop-eye sling called the Y-Guard which is said to offer greater safety to workmen's hands. The wedge-shaped Y-Guard steel ferrule is said to streamline the sling so that it may be easily pulled out from under loads, making it safer to handle. This improved loop-eye sling is made of preformed Whyte strand, plow steel

Loop-eye sling designed for safer handling

wire rope, and it is claimed that its efficiency is comparable to a sling equipped with sockets. The loop eyes easily encircle crane hooks.

## Accessibility Featured in Truck Design

FORD MOTOR CO., Detroit, Mich., is stressing accessibility of engine and other equipment in the 1940 line of trucks which include 42 body and chassis types, six wheelbases and three V-8 engines. Hydraulic brakes are used on all units. An 158-in. wheelbase chassis is now available in both conventional and cab-over-engine types.

Longitudinal front springs make the engine more accessible from the bottom. At the same time, accessibility of oil gage, air cleaner, spark plugs, fuel pump, carburetor and generator has been increased by lowering the sides of the hood. The fan is mounted on the crankshaft, making it easier to reach the distributor.

As the new design provides for drive through the springs, chassis changes have been introduced which

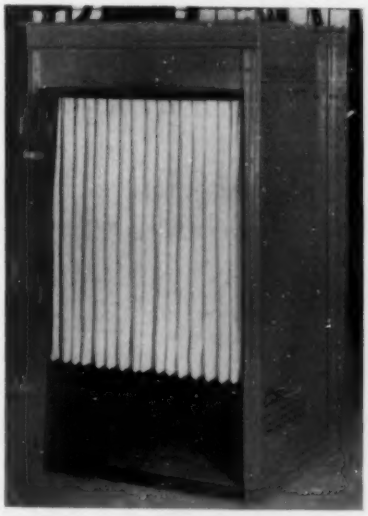
Hood of truck lifted up to show accessibility of power plant

make it easier to service the clutch, transmission, universal joints and rear axle and facilitates the installation of special equipment.

## Compact Dust Filter

THE W. W. SLY MANUFACTURING CO., Cleveland, Ohio, has announced a simple, compact dust filter in which has been incorporated many features found in their larger equipment. This filter can be placed close to individual machines or used as auxiliary equipment for all types of dust conditions in connection with large dust filters. The flat cloth bags for cleaning the dust-laden air are shaken down by hand with the handle shown to the right side of the filter.

Four sizes are available with a net cloth filtering area ranging from 88 sq. ft. to 352 sq. ft., handling an air volume from 350 c.f.m. and under up to 1500 c.f.m.



Small capacity, cloth bag dust filter used on individual machines or as an auxiliary unit


# *FOR* ST. LOUIS

## *and the* INDUSTRY'S BIG CONVENTIONS AND EXPOSITIONS *at the*

## HOTEL JEFFERSON

NATIONAL SAND AND GRAVEL ASSOCIATION
and the
NATIONAL READY MIXED CONCRETE ASSOCIATION

***January 17, 18 and 19, 1940***

✦ ✦ ✦

NATIONAL CRUSHED STONE ASSOCIATION

***January 22, 23 and 24, 1940***

**All producers, irrespective of Association membership, are invited to attend, to participate in the proceedings, and take advantage of the educational features which the programs and the expositions afford. Don't miss the round-table discussions of the industry's problems.**

*Everyone Invited*
*Be there! Everybody Else Will!*

# NATIONAL ASSOCIATION ACTIVITIES

## Crushed Stone

A. T. GOLDBECK, engineering director, National Crushed Stone Association, had a 6-page article in the September-October issue of the *Crushed Stone Journal* on "Research Needed on Accelerated Weathering Tests." This article points out that there is a growing feeling that although accelerated weathering or soundness tests as practiced in the past frequently have given valuable indications, they are not as reliable or as indicative as they should be. Mr. Goldbeck suggests in closing that a systematic attempt be made to outline and carry out a complete investigation involving the influences which are important in connection with the durability of concrete so that finally satisfactory laboratory tests may be evolved which will enable the prediction as to whether the constituent materials of concrete or whether the concrete itself will be suitable for the particular exposure of conditions to which it will be subjected.

## Ready Mixed Concrete

EXECUTIVE SECRETARY AHEARN sent out a general letter to the members of the National Ready Mixed Concrete Association to correct a statement which appeared in the public press on November 1 which indicated that the settlement of jurisdictional disputes between the teamster and operating engineers' unions involved the ready mixed concrete industry. The association has been authoritatively advised that the jurisdictional ruling in the Washington case had no bearing whatever upon the ready mixed concrete industry, but was the outgrowth of a dispute between the teamsters and the engineers as to which of these two unions had jurisdiction over certain phases of actual highway construction, particularly in the bituminous field. When the controversy first presented itself, Mr. Tobin, president of the teamsters union and Mr. Possehl, president of the operating engineers, asked the AFL to make a ruling. A committee, consisting of officers of the carpenters, bricklayers, and electrical workers' unions, before making a ruling obtained an agreement from Mr. Tobin and Mr. Possehl that the settlement would include building work as well as highway work, and each next agreed that the union he represented would accept the jurisdictional ruling.

The following decision was arrived at:

"All power-driven equipment that is used exclusively as a vehicle to transport any material or other matter for building or other construction work comes within the jurisdiction of the Teamsters and Chauffeurs.

"All power-driven equipment used on any and all types of building and other construction work including any and all power-driven equipment that has been in dispute between the Teamsters and Engineers, comes within the jurisdiction of the International Union of Operating Engineers."

It was this ruling which was misinterpreted by the press. Inquiry at the offices of the AFL, however, brought a statement from John P. Coyne, president of the building and construction trades department, that while the phraseology of the ruling would lead the uninformed reader to assume that it included the ready mixed concrete industry, that this positively was not the case. The question of jurisdiction over the operation and unloading of ready mixed concrete trucks was settled definitely at a meeting of the executive council of the AFL held in Miami, Fla., in 1938 which held that the teamsters union had jurisdiction in this case. This action was also ratified at the annual convention of the AFL.

### COMING CONVENTIONS

**Chemical Exposition, Grand Central Palace, New York City, December 4 to 9.**

**National Sand and Gravel Association and National Ready Mixed Concrete Association, Hotel Jefferson, St. Louis, January 17, 18, and 19.**

**National Crushed Stone Association, Hotel Jefferson, St. Louis, January 22, 23, and 24.**

**American Road Builders and Road Show, Chicago International Amphitheatre, Chicago, January 29 to February 2.**

**National Concrete Masonry Association, National Cinder Concrete Products Association, and Cast Stone Institute, Mayflower Hotel, Washington, D. C., February 12, 13, and 14.**

## Agricultural Engineers

THE AMERICAN SOCIETY of Agricultural Engineers will hold its Fall meeting at the Stevens Hotel, Chicago, December 4 to 8, inclusive. In the Farm Structure Division, several addresses will be presented on farm house modernization and the construction of buildings and bins with concrete. The official publication of the society for November also contains an interesting article on Laboratory Tests of Concretes and Mortars Exposed to Weak Acidity which is of interest to the rock products industry.

## Road Mix Plant Recommendations

THE ASPHALT INSTITUTE, New York, N. Y., has issued three booklets which should be of interest to the aggregates industries. Number 5 covers materials, No. 49 deals with design and construction of the plant-mix and other information on its uses, and No. 50 on equipment covers mixing plants. This information has been compiled from papers presented at the last national asphalt conference in Los Angeles, Calif.

## Compile ASTM Standards

ANNOUNCEMENT has been made by the American Society for Testing Materials, Philadelphia, Penn., that the 1939 compilation of specifications and test methods covering cement is now available at $1.00 per copy. Changes made in specifications and tests as recommended by Committee C-1 are included. Five specifications cover portland, high-early-strength portland, natural, and masonry cements, and sieves for testing purposes. Other standards cover the chemical analysis of portland cement, sampling and physical testing, including a Manual of Cement Testing and Selected References on Portland Cement. Other tests cover compressive strength of portland cement mortars and fineness of cement by means of the turbidimeter.

# Cement Takes Spotlight At Industrial Minerals Meeting

### Fall meeting of A.I.M.E. at Tuscaloosa, Ala., Attracts Good Attendance

By PHILIP H. DELANO*

MORE THAN 200 ENGINEERS of the mineral industries met at Tuscaloosa, Alabama, November 2-4, for the Fall Meeting of the Industrial Minerals Division of the A.I.M.E. held with the cooperation of the Institute of Ceramic Engineers.

The meetings were presided over by Dr. M. M. Leighton, State Geological Survey, Illinois; J. E. Lamar, State Geological Survey, Illinois; J. R. Cudworth, Alabama State Bureau of Mines; Dr. T. N. McVay, University of Alabama; B. C. Burgess, Tennessee Mineral Products Co., Spruce Pine, N. C., and Will H. Coghill, U. S. Bureau of Mines, Tuscaloosa, Ala.

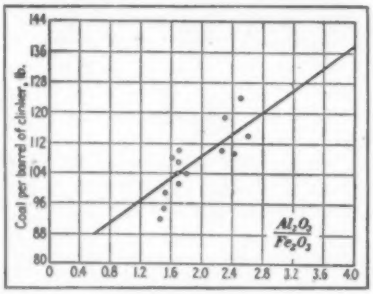
Papers included "Kyanite in the Piedmont Province of Alabama," by Edgar Bowles; "Alabama Marble," by W. H. Runge; "A New Discovery of Bentonite in Southern Alabama," by Edgar Bowles; "Flotation of Diatomites," by Oliver C. Ralston and J. E. Norman; "Kaolin and Mica Fines," by James A. Barr, Jr.; "Bentonite," by Paul Bechtner; "Ball Clay in Western Tennessee," by R. B. Carothers; "Processing and Refractory Properties of Southern Clays," by W. H. Vaughan; "Occurrence and Distribution of Spodumene in North Carolina," by T. L. Kesler; "Utilization of Talc," by Hans Thurnauer; "Phosphate Rock Reserves in Tennessee," by G. I. Whitlatch; "Barite, Fluorite, Galena, Sphalerite Veins in Middle Tennessee," by W. B. Jewell. In the paper, "The Limestones and Dolomites of Alabama," Dr. S. J. Lloyd discussed briefly the occurrence and uses of limestone and dolomite in Alabama. More than 2,500,000 tons were marketed in 1937; for fluxing stone (890,000 tons, largely dolomite for iron furnaces), lime (325,000 tons), building stone (300,000 cu. ft.), roads construction (325,000 tons), portland cement (900,000 tons), and agricultural purposes (108,000 tons). A survey of the limestones and dolomites of Alabama has been made, and a comprehensive report will shortly be published by the Alabama Geological Survey.

*Engineer, U. S. Bureau of Mines, Tuscaloosa, Ala.

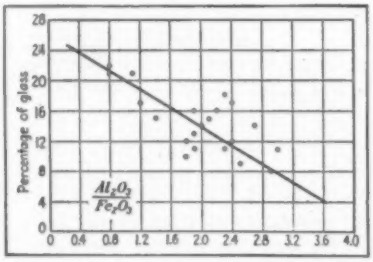
With J. E. Lamar and J. R. Cudworth as chairmen, one session was devoted to papers and discussion of cement and cement products.

#### Southern Cement Practices

W. H. Caruthers, sales engineer, Birmingham Slag Co., presented the first paper on "Production and Uses of Blast Furnace Slag Aggregates." Great tonnages of slag are available




Effect of alumina-iron ratio on fuel consumption




Effect of alumina-iron ratio on glass content

in the Birmingham district as a by-product of iron making. This slag is widely used in concrete, roofing granules, and largely as road metal or aggregates for highway construction. As most of the fluxing stone used in the district is dolomitic in character, the resulting slag is too high in magnesia for use in portland cement manufacture. A slag cement, however, is manufactured by the Southern Cement Co., in Birmingham, Ala., by curing granulated slag with lime. This is a puzzolan and not a portland cement. Other uses of slag as, for example, manufacture of rock wool and glass, were briefly discussed.

G. W. Jordan, Southern States Portland Cement Co., and D. P. Hale, Jr., Cartersville Barium Corporation, presented a paper on "Georgia Ocher in Portland Cement," which is published as TP 1135 in *Mining Technology* for November. The presence of iron in portland cement has distinct advantages. In the process of manufacture, the iron oxide content lowers the fuel consumption, increases the ease of proper burning, and lessens the destructive action on the kiln refractories. Iron oxide improves the quality of the cement by reducing expansion and contraction, increasing strength, increasing resistance to thawing and freezing, and increasing resistance to sea or sulphate waters. Cartersville ochre offers the cement industry a stable source of a high iron product consistent in chemical properties and low in silica which competes on a price per unit basis with other sources of iron for cement manufacture.

E. F. Burchard, United States Geological Survey, presented a paper describing "The Cement Industry of Alabama." There are six plants in Alabama producing portland cement. Four of these use the wet process and two use the dry process. Four plants produce several types of cement for which there is demand while two plants produce only the standard portland cement. Beside the plants producing portland cement there are two others which manufacture slag or masonry cements. The paper was illustrated with slides of the plants and manufacturing processes.

#### Lightweight Aggregates

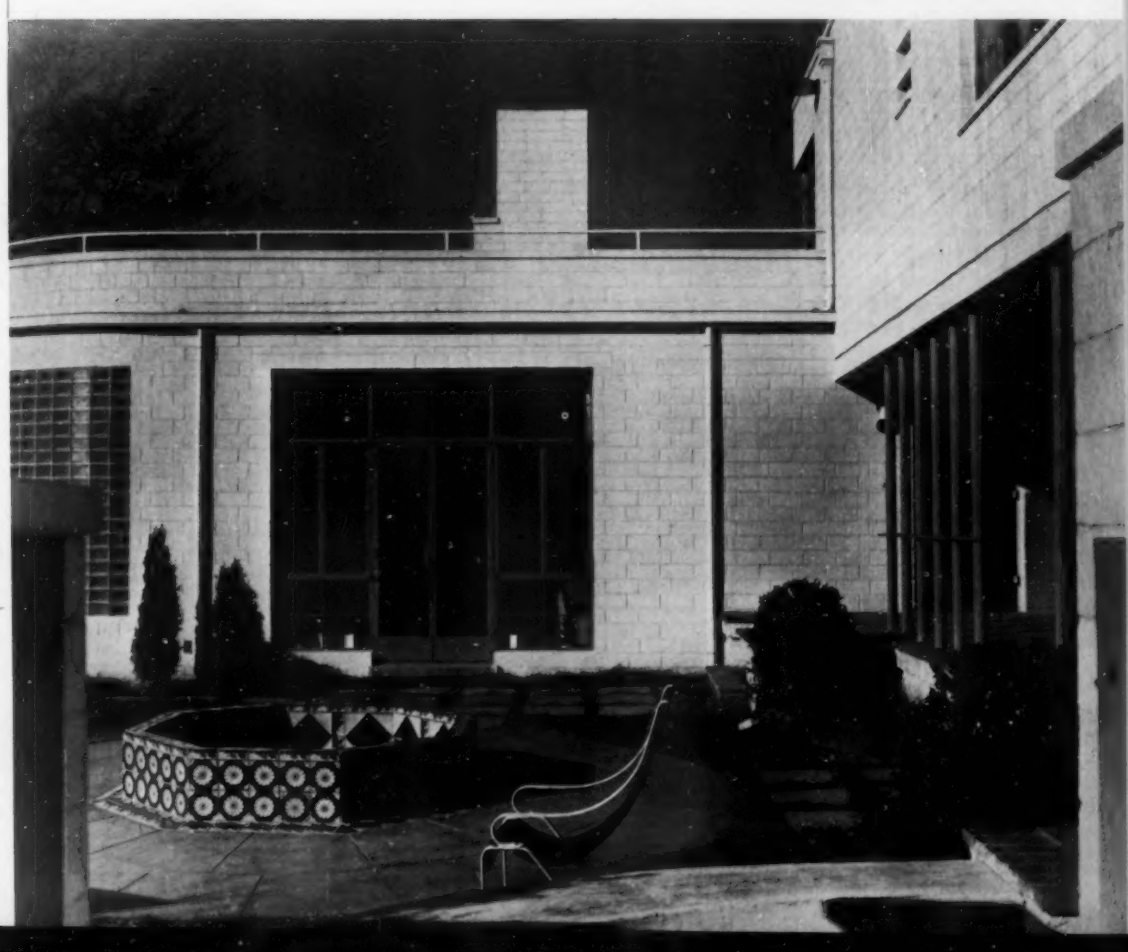
Christopher Robinson, Republic Steel Corporation, presented a description of "Processing of Super-rock." Super-rock is granulated slag which is especially suitable for light weight concrete aggregates, masonry and precast sections, light weight structures, and heat resistant or sound absorbent application. Mr. Robinson described the manufacture of Super-rock during which molten slag is expanded in a water spray to a density of 1100-1300 lbs. per cubic yard. This density is optimum as lighter material is too fragile. Super-rock may be used in lean mixtures to give sections with a density as low as 50 lb. per cubic foot and these light sections are nailable. Numerous applications of these light weight aggregates are being made.

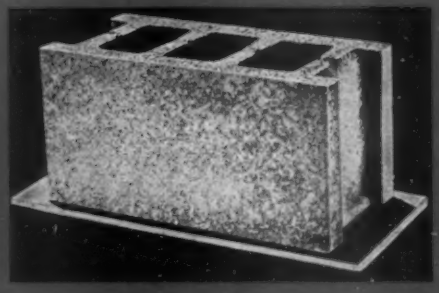
After the technical meetings, inspection trips were made to several plants in the Birmingham area including the Harbison-Walker Refractory Co., at Bessemer, Alabama Clay Products Co., at Bessemer, and Universal Atlas Cement Co., at Leeds.

# CONCRETE PRODUCTS AND CEMENT PRODUCTS

## Concrete Tile Walls

**Modernistic home of Mr. and Mrs. Darwin Kirk designed by Architect Donald McCormick. Concrete units furnished by Chandler Materials Co., Tulsa, Okla.**



# This Leading Concrete Products Plant Makes ALL Units on ONE Set of Plain Pallets

Cinder Block, Inc., of Detroit, Michigan, is one of the country's leading and best known concrete products plants. The large number of units shown in the picture are being made on the SAME SET OF PLAIN PALLETS on their Besser Plain Pallet Strippers.

Not only in plants like this, but in a multitude of smaller plants, the saving in pallet cost has paid for the machines several times over. The Plain Pallet feature is available in machines of various production capacities in both Tampers and Vibrators.

Besser Plain Pallet Strippers lead in economy of first cost and economy of operation.

## TAMPERS
## BESSER PLAIN PALLET STRIPPERS
## VIBRATORS

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**Besser Super Automatic Plain Pallet Stripper** — Daily Capacity 3000 to 4000

**Besser Victory Automatic Plain Pallet Stripper** — Daily Capacity 2000 to 2500

**Besser Semi-Automatic Plain Pallet Stripper** — Daily Capacity 1200 to 1500

**Besser Champion Power Operated Plain Pallet Stripper** — Daily Capacity 1000 to 1200

**Besser Multi-Mold Hand Operated Plain Pallet Stripper** — Daily Capacity 250 to 350

**BESSER VIBRAPAC PLAIN PALLET STRIPPERS**

**Besser Automatic Vibrapac Plain Pallet Stripper** — Daily Capacity 4000 to 5000

**Besser Power Operated Vibrapac Plain Pallet Stripper** — Daily Capacity 2000 to 2500

**BESSER-FLAM VIBRATOR**

**Besser-Flam Plain Pallet Vibrator** — Daily Capacity 800

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**EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER**

# Earthquake-Proof Structures

**Concrete masonry units made by the "Underdown System" and reinforced with steel rods reduce building costs**

DESPITE THE FACT that earthquake specifications limit types of constructions that are acceptable through California, concrete masonry is progressing and units are being designed which satisfactorily meet these requirements. As reinforcing steel is mandatory in all kinds of masonry structures, the manufacturer of concrete units must have a unit design to permit the placing of required steel without too much delay in laying up a wall.

With these objectives foremost, the precast division of Pacific Coast Aggregates, Inc., San Francisco, Calif., has established a rather unusual plant at Niles, Calif., near San Francisco, for mass production of reinforced concrete building units by what is known as the "Underdown System." Donald G. Underdown, inventor of the unit, has erected thousands of dwellings in England with the system and a great number of industrial and residential structures in California.

### Two Units Form Hollow Wall

About four years ago the company produced some of these units at Oakland, Calif., and after a series of exhaustive tests built the large, modern plant at Niles completed early in 1939.

Designed for maximum wall area with minimum weight and for ease in laying, the new unit is 12-in. high and made in 18, 24, 30 and 36-in. lengths. One face is flat and the other is of concave design with a lug projecting out from the back near each end and extending the entire height of the unit. The lug projects out so that when two units are laid back to back, an 8-in. hollow wall is formed. This wall thickness can be widened out if necessary. Between the ends and lugs of four adjacent units is formed the stud space for placement of vertical steel, having a cross-sectional area of about 32 sq. in. for an 8-in. wall. Void space including the studs is about one-third the cross-sectional area.

Each unit is reinforced longitudinally with two ¼-in. plain round bars, about 10 in. apart and projecting out into the stud space where a pre-bent hook on each end is tied across to the next unit hook, thus with No. 6 gauge wire providing continuity of horizontal wall reinforcing. Stud reinforcing usually is standardized with ¾-in. round steel, extending from the foundation of the wall into the horizontal beams, and the stud concrete is generally poured after each third course of units is laid. Units are manufactured with sand and gravel concrete, and insulation is provided by the dead air space, which may be filled with rock wool, gravel or some other desirable material. A ½-in. semi-circular groove is cast the length of each unit on each mortar bed surface and spacer straps are inserted between pairs of units as set up in the wall.

Special sections are made to form round and square corners, for tie beam and spandrel beam details, for construction that provides for columns of pilasters and even some with ventilator holes. The types of

**Showing bins, mixer, and production line of cars holding concrete filled molds of masonry units ready for surface texture treatment**

jobs for which they are being introduced are principally residential dwellings but also for stores, warehouses, garages, retaining walls, etc.

Units are sold on the basis of square footage in the completed wall and on the type of texture, a number of surface treatments being applied to get distinctive architectural ef-

**Assembly of molds on way to mixer hopper. Molds are assembled at end of curing shed in which special units are made**

**Closeup of concrete placing operation showing relative position of mixer, hopper and screed shown at extreme right**

**Above: Supporting frame for monorail hoist used for stripping units and storage on ground supports at each side. Below: Overhead hoist and clamping device for stripping the ten units on channels which rest on supports**

fects. Cost of walls built by the "Underdown System," it is claimed, is only 10 percent higher than good frame construction. Erection speed and the absence of forms are the principal reasons given for its economy.

### Manufacturing Methods Are Unique

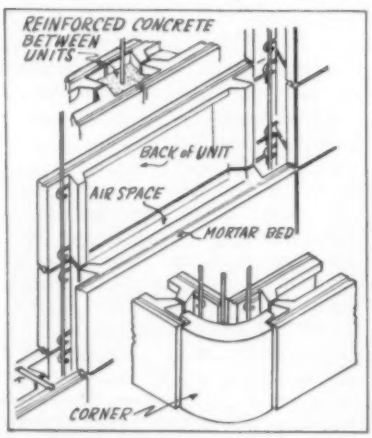
At Niles, Calif., Pacific Coast Aggregates, Inc., operates one of the largest of its 15 rock, sand and gravel producing plants and has built up a sizeable surplus of ¼- to ½-in. pea gravel. This surplus along with the closeness to a large market was a consideration in selecting the site for the concrete products plant. Location is such that the yard locomotive crane can conveniently load the bins with aggregates.

Plant arrangement, method of placing concrete, and the handling of finished units are very much unlike practices in a standard block plant. Manufacturing equipment includes a stationary concrete mixer, bins, a special discharge hopper to place concrete by vibration into gang molds, and a continuous track over which the molds are conveyed on cars by a car puller operated by an endless cable. Capacity of the mixer and the placing system is 2500 units per day, which represents considerable wall area.

Operation is continuous, with assembled molds traveling at a constant speed of 5 ft. per minute from the mold assembly side of the plant around a continuous track to the concrete placing mechanism, and continuing on to the finishing side. The horizontal track, of concrete cast with depressed guides, 20-in. apart, for rubber-tired wheels, has an overall length of 148 ft. from end to end and is curved on 46-ft. centers at both ends. These guides were considered preferable to rails in order properly to negotiate the short radius curves.

The carpuller is driven by a 1½-hp. 1725 r.p.m. geared head motor, reduced down to 2½ r.p.m., with the endless cable attached to the back end of the last mold car in an uncoupled train so that when started up the entire train is pushed around to the mixer plant and beyond. From this point, each car is handled individually for the application of float or textured finishes.

Each car holds forms for 10 units constructed with the flat side of the unit up, and with the top of the car




**Showing how reinforced masonry units are laid up in wall. At the bottom is the special corner unit**

30 in. above the track. This is a good working height for the hand application of surface textures before stripping the molds. The arrangement is really a single large mold with divider strips inserted 12 in. apart—the whole resting directly on two longitudinal 3-in. lifting channels, making it easy to lift it from the car for handling into storage.

### Control Cement-Water Ratio

Forms for a series of units are assembled on the cars in advance of a run with the help of an overhead 1-ton electric chain hoist, and form oil is sprayed uniformly over each mold.

Bin storage is 120 tons, half for pea gravel and the other for concrete sand, which is graded up from 200-mesh to ¼ inch. Five bags of cement are used in a cubic yard of concrete to attain a compressive strength of 2500 p.s.i. and a slump of 3 in. Control of consistency is of utmost importance in placing the concrete by the method used.

Water is metered and a weigh-batcher proportions the aggregates into a 1½ sack mixer, which discharges into a specially-designed hopper that distributes and places concrete into the molds as they pass under the hopper. The hopper tapers to a narrow opening crosswise to the molds with its bottom barely clearing the mold tray. Width of the hopper is adjustable by spreading the sides for various unit lengths. About 20 cu. ft. is the capacity of the hopper, which has a vibrating element in the bottom that uniformly places and vibrates concrete into the various molds as it discharges through the hopper bottom.

The vibrating element comprises a seamless steel section of tubing, encased in rubber to prevent abrasion, which is mounted in the center of the opening through which concrete must discharge. Vibration is imparted to the concrete flowing to the molds as it passes through a 2-in. opening on each side of the vibrator. As shown in the illustration, it extends across the hopper opening the full width of the mold cars, and rotates at 5000 r.p.m., the action being similar to spud vibrators used in placing mass concrete with the vi-

*(Continued on page 62)*

**Above: Showing how hoist and clamp place units on post supports. Below: Robert C. Ford, manager of plant**

# Making 8000 Block Per Day

**Low pressure steam cured concrete block with two continuous mortar grooves are in popular demand in Indianapolis area**

PLACING CONCRETE by vibration is no longer a new method, but its application to the manufacture of standard concrete building block on a commercial production scale is a development which is increasing in use. In Indianapolis, Ind., Spickelmier Fuel and Supply Co., large building supply dealer and concrete products manufacturer has been producing masonry units on a Stearns vibrating machine since February, 1938.

Two plants are operated by this company in Indianapolis. Gravel block as well as Haydite lightweight units are being manufactured on the vibrating type machine at the main plant.

Layout remains about the same as it was, with the structure abutting a row of large concrete storage bins for aggregates. The plant is gravity-operated, aggregates being conveyed by screw conveyors into individual weigh batchers for each material over each mixer above the block machines. Each material is weighed separately to insure uniform quality. Aggregates used in the manufacture of lightweight blocks are minus ½-in. and minus ¼-in. Haydite or pea gravel and sand which, with cement and water, constitute the mix for concrete block. All mixes for vibrated block are semi-dry, the mixing being done in a 21-cu. ft. Blystone mixer on the floor over the machine.

Since installation of the Stearns Joltcrete the plant has been operating on a 10-hr. daily schedule, producing units in 3-, 4-, 5-, 8-, 10-, 12-, and 16-in. lengths. On this particular machine, these widths may be produced to any practical height up to 8½ in.

### Reduce Weight of Block

According to officials of the company, tests of the block have revealed a number of desirable qualities from the standpoint of economy. They are also being merchandised at a premium price. It is possible materially to reduce the cement content per block and still maintain a compressive strength well above required standards. This saving in portland cement can be traced to several reasons.

Vibration, according to Carl Spickelmier, is controlled so that the cement paste does what it should in good concrete—merely coat the particles to be bonded together. As there is no fracture of the larger particles of aggregate, the required amount of cement paste is reduced. Units produced in this way have the density and compactness which permits an increase of coarse aggregate in relation to fine aggregates.

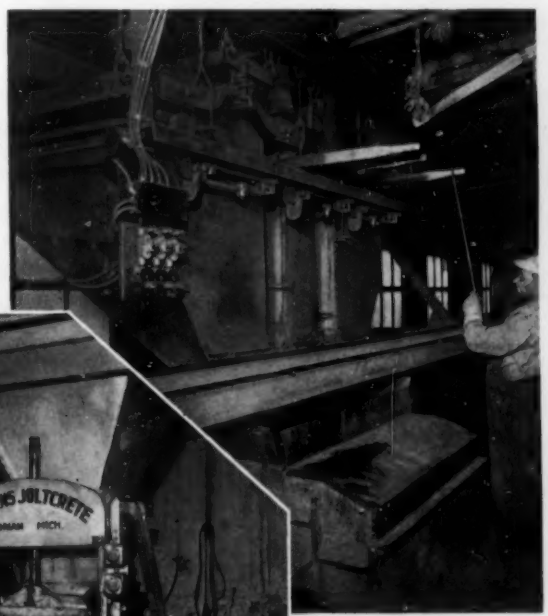
### Blocks Cured With Low-Pressure Steam

Simultaneously with installation of the machine, the plant has been modernized with facilities for curing by low pressure steam. A material saving of curing time has thus been effected, permitting earlier handling without breakage into outside storage where the curing cycle is completed. By reducing the steam curing time an appreciable saving has been made in pallet costs. The 8-, 10- and 12-in. block are cast with two continuous mortar grooves around the block, longitudinally, designed to give better bond when placed in a wall. Approximately 50 minutes is needed to change over the machine to manufacture a block of another size.

Total connected electric power is 8 hp., with a 3-hp. motor driving the stripper and one of 5 hp. connected to the vibrating mechanism.

Constructed in 1930, the plant facilities have been increased so that now the capacity is from 7000 to 8000 standard block per working day. Kiln capacity is adequate to handle this production.

Officials of the company are Carl Spickelmier in charge of operations and Ernest Spickelmier in charge of sales. A third brother, Fred Spickelmier, operates the insulation department of the company. Herbert Devault is superintendent of the products plant.



Right: Individual batcher for each block machine


Left: Making grooved block on a vibration type machine

## Earthquake-Proof Structure

(Continued from page 60)

brating force transmitted radially. A 1725 r.p.m. 2-hp. motor through V-belt drives the element, which is an off-balance shaft mounted in self-aligning Hyatt roller bearings. The vibrator assembly is insulated from the hopper by rubber blocks.

A minimum surplus of material extends about ⅛-in. above the flush level of the molds to insure complete filling, and the forms then pass under a motor-driven screed which strikes off the excess concrete. All the controls, including starter buttons for the mixer, vibrator and car puller, are centered near the mixer operator's station.

### Special Surface Textures Given With Brushes

Having passed the screed, some hand attention, such as the application of a float or trowel finish is given. Cars are then separately pushed under the roof of the assembly section of track for further texture treatment, or in any event, to cure one day before de-palleting and stripping takes place.

After setting an hour or two in the forms many of the units are given a brush texture finish, popular with architects for exteriors by gently pulling a camels hair push brush across the faces of the units. A coarse fiber broom is used on some for keying purposes if the wall is to be plastered. Aggregate is sometimes exposed the day after pouring by rubbing the surfaces with burlap and then hosing them if that type of finish is desired. Sometimes oxides are used to color units to be used for special construction.

Stripping is done the day after pouring, using the overhead one-ton hoist, which travels on a trolley over the track and out into the storage yard. A special clamp arrangement, which makes a four point contact on the underside of the channels holding all the units on one car, is used to raise all 10 units at once. Out in the yard each end of the two channel beams is lowered to rest on posts, as shown, where the individual units are stripped after the clamp is disconnected. Similarly, 40 or 50 units, after curing, are placed on loading pallets and lifted onto trucks. The layout is so arranged that other truckways may be added later. Units are covered with burlap and moist cured 10 days, followed by 21 days air drying before shipment.

A mechanical vibrator is used for manufacturing hand-poured units, such as piers, fence posts, surveyors monuments, stepping stones, sills, jambs and lintels.

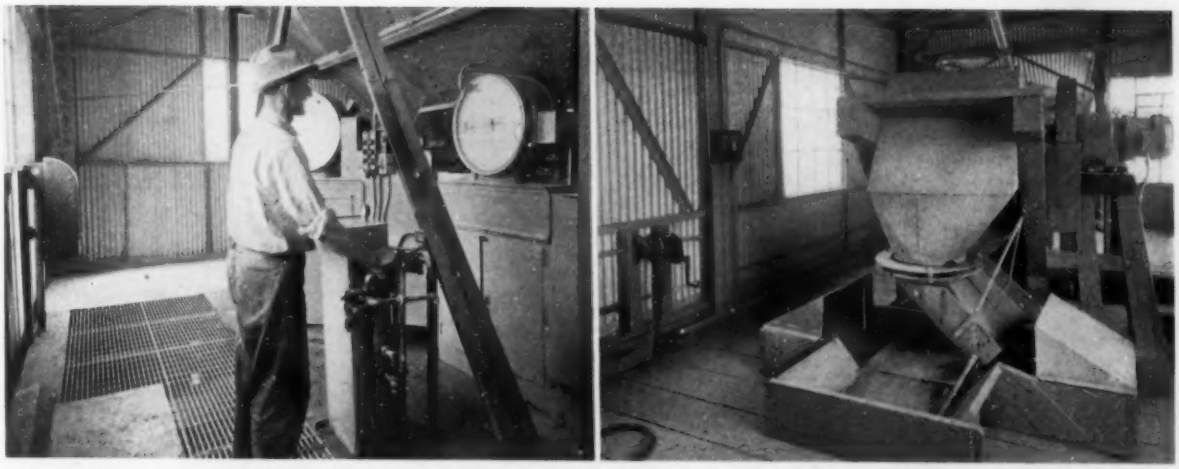
Robert C. Ford, long associated with Pacific Coast Aggregates, is in charge of all activities of the precast division, which is licensed to operate throughout Northern California.

### Half Million Units In One Order

PRATT BROTHERS AND BOISE, Celina, Ohio, are reported to have obtained contract for a half million units of concrete block and waylite block for constructing 33 apartment houses in an FHA project at Kokomo, Ind. Also included in the contract, which will require five months to complete, are window sills and lintels.

### To Build Block Plant

CINDER PRODUCTS CORP., Providence, R. I., plans to build a new plant and add new equipment, according to Royal Sterling, general manager. The new plant, costing $25,000, will take the place of the one which was destroyed by the 1938 hurricane. The plant in temporary quarters has been so busy that it has been operating six days a week and many nights to keep up with orders.



Left: Single operator handles all mixing operations with photo-electric relays controlling batching. Right: Aggregates are conveyed and placed in proper bins with rotating chute. On left is winch to operate similar chutes on level below to place aggregates in proper bin pockets

# Continuous Dispatching of Pre-Shrunk Concrete

**Five driveways under plant allow continuous operation of truck fleet with a batch of concrete always ready for a truck**

By **BROR NORDBERG**

YEARS OF EXPERIENCE in operating ready-mixed concrete plants went into the design of the new central mixing concrete unit of Pacific Coast Aggregates, Inc., San Francisco, Calif. It has features that are distinctly new, is as close to fully automatic in operation as any plant, and has practically all the labor and time-saving mechanical devices deemed necessary for positive control and accuracy in batching.

Located in the heart of industrial San Francisco at Seventeenth and Harrison Sts., the new plant occupies a full square block and is adjacent to a dry-batching plant formerly owned by the Golden Gate Atlas Materials Co. Including the remodeling of the existing retail aggregates plant and yard facilities, the cost of the new unit is estimated at $250,000.

Left: Air cleaner installed to vent cement silos while being filled by pump. Right: One of two 60-cu. ft. mixers. On right is car on rails for charging mixers

### One-Man Control For Aggregates Routing

Pre-shrunk concrete is popular in the San Francisco area, and the new plant is designed to dispatch mixed concrete continuously into transit mixers, but yard facilities are such that batched dry aggregates may also be handled. The old plant, a dry batch layout, seen to the left of the new concrete plant, was and still may be used for batching out concrete aggregates to be mixed in transit, and is also for retail distribution of aggregates. It furnishes large supplementary storage of aggregates available to the concrete plant with some remodeling for ready transfer.

Total storage for aggregates in the old aggregates plant is 1800 tons in 16 bins, and 650 tons is provided for in the concrete plant proper. Aggregates are produced in 15 plants by Pacific Coast Aggregates, Inc., largest producer in northern California, and are shipped in by rail for transference to a rail spur at the plant. Two trucks and hoppers allow the handling of two cars simultaneously, one bucket elevator, 85-ft. centers, handling sand, the other gravel or rock into storage. The elevators operate at 250 f.p.m. At the top of

From top to bottom: E. B. Kendall, operating manager; Ray Coyle, yard superintendent, standing next to loud speaking system; pneumatic tube system in dispatcher's office for interchange of communications with truck drivers; one of the modern truck mixer units leaving with a load

the plant, materials either transfer to 24-in. shuttle conveyor belts to be deposited in one of the 16 aggregate bins or may go on to a 30-in. belt conveyor, 160-ft. centers, to be delivered into the concrete plant bins. The conveyor has Bodinson Manufacturing Co. 3-unit troughing idlers. Routing of the aggregates and operation of the handling equipment from the cars is controlled entirely from the concrete plant by an operator stationed at the conveyor head where a master switch and panel of 16 switches operating solenoid-actuated air valves on gates and belts is located.

The concrete plant itself has a capacity of 150 cu. yd. pre-shrunk concrete per hour.

The concrete plant stands 85 ft. high to get needed altitude for aggregate storage above the batchers and to accommodate 4000 bbl. of portland cement in bulk cement bins. Cement is received by rail or truck and pumped through a 5-in. line into cement storage by a Fuller-Kinyon portable unloader.

### Clever Arrangement of Chutes

For operation of the unloader there is provided a 600 c.f.m. type "C120" Fuller-Kinyon air compressor. The valve arrangment at the discharge end of the line is such that cement may be put in either of the four compartments provided in the two 2000-bbl. bins. This allows the handling of preferred or tested cements to fit customer requirements. Flexible rubber hose fittings are used to connect with the silo ports. Each of the silos vents to a common Fuller-Kinyon "airveyor" which handles from 400 to 500 c.f.m. of dust-laden air. Cement trapped in the sacks within the "airveyor" is automatically returned to storage at intervals through action of a motor-driven cam.

Arrangement of the plant consists of two 60-cu. ft. Twentieth Century, Norris K. Davis mixers on the floor above the truck runways, two automatic batchers on the next floor above, and separate aggregate bins over each batcher. Cement storage is not above the batchers, inclined screw conveyors being used to convey the cement to the weigh hoppers.

Incoming aggregates direct from the rail cars, or from the 16 dead storage bins, are placed in the proper compartment of the live

View of retail yard and concrete batching plant. To the right is the new concrete plant and to the rear is the old aggregates plant

storage bins by a clever chute arrangement controlled by the material man from his post at the head of the in-coming aggregates conveyor belt. The conveyor discharges through a steel hopper and turntable chute which may easily be rotated (see illustration) to feed one of several chutes directing material into either of the three bins below.

To direct these materials into the proper pocket of either bin, each of the bin chutes at its discharge end has a similar chute just above the point where materials enter the bins which is set by a hand-operated winch through cables by the same operator from his station, above.

Each main bin holds 270 tons with a smaller bin between them with 110 tons of makeup sand, comprising a total of nine bins. The small bin contains a fine sand from the company's Olympia sand plant, high in minus 30-mesh material which is proportioned into the batch to increase fines in making up some specification concrete. The normal mill run sand contains 20 to 25 percent passing 30-mesh, for example, and for state highway construction 35 percent is required.

### Batching and Loading

Two No. 52 Noble automatic batchers handle the weighing of each aggregate separately and the cement in its hopper. When set in motion they are entirely automatic and positive. Each is operated under one of the main aggregate bins, with the auxiliary sand bin between to serve both weigh batchers. The arrangement is such that loading out to truck mixers is a continuous operation.

In full operation six batches are being handled all the time; one in each of the two batchers, the mixers and the hopper cars which empty into the mixer drums. Five driveways under the plant allow continuous operation of the truck fleet so that a batch of concrete is always ready for a truck.

All the batching and mixing operations for each half of the plant are handled by one operator. Automatic control has proved a time-saver and more accurate than manual operation. A single control unit, using photoelectric relays thrown into action by movement of the scale indicator, regulates positively the proportions of each material. Desired weights of each aggregate are set on the aggregate scale beam, a lever is thrown and the exact weights of each grade making up the mix are measured out, with automatic shutting off of each source of supply occurring in sequence.

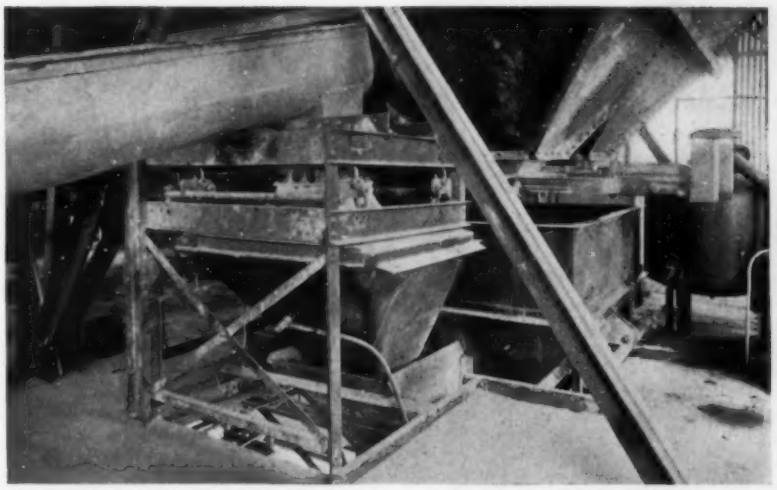
Solenoid-operated air gates control the feed of aggregates from the main aggregate bins above the batchers, the gates closing quickly and accurately when the desired weight has entered the batcher.

Fine sand from the auxiliary bin is discharged into the two batchers over separate 18-in. horizontal belts, each driven by a two-speed, 3-hp. motor. The bulk of the material is put into the hopper with the belt traveling at 300 f.p.m. and when the batcher contains within 100 lb. of the desired weight the belt speed automatically changes to 100 f.p.m. This is for the purpose of more accurately controlling the amount of material, and a solenoid-actuated brake stops the motor when the control switch shuts off to prevent coasting of the belt. Similarly, on the main bins, the air cylinders are of the dribble-type partially to close the gates as the amount of aggregates released approaches the desired weight. The cut-off to a dribble flow and the final cut-off are sharp and accurate. Each batcher has 4-cu. yd. capacity. However, at present only 2-cu. yd. batches are used with the 4-cu. yd. mixers.

The same types of controls start and stop the screw conveyors feeding cement from the bins into the cement batcher, which is independent of the aggregate batcher and has a separate scale. Inclined screw conveyors from each silo and a cross screw connecting the two silos makes available either of the types of cement in stock to either batcher.

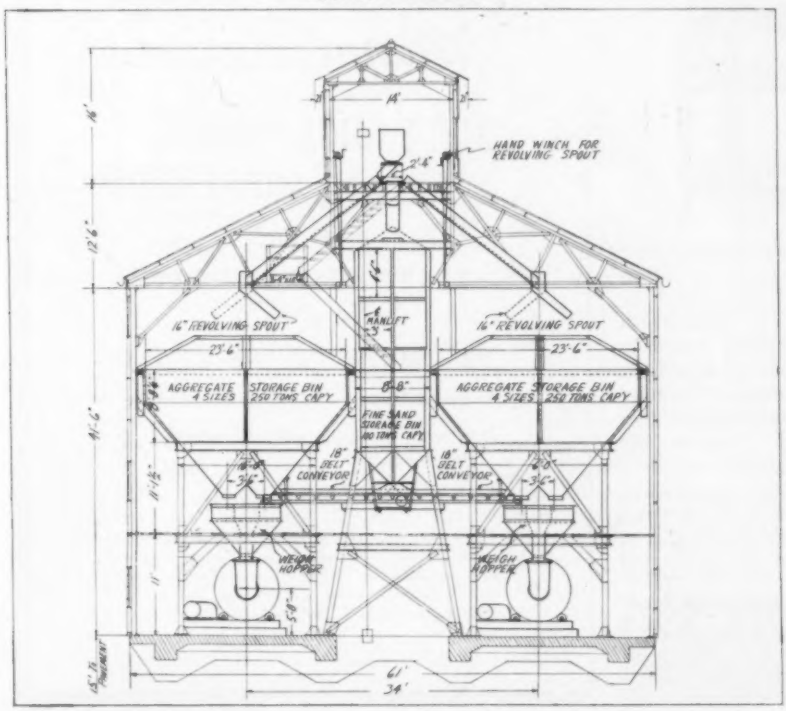
Water, from the city mains, is piped through a meter into two 250-gal. Ransome siphon tanks and then into the mixers at the same time as aggregates are dropped into the mixers. A solenoid-operated air piston on the water valve shuts off the supply water in the line at the desired volume and then opens the release valve.

After the cycle of batching has been completed, the operator throws a control lever to the dump position, drops the batch into the mixer be-

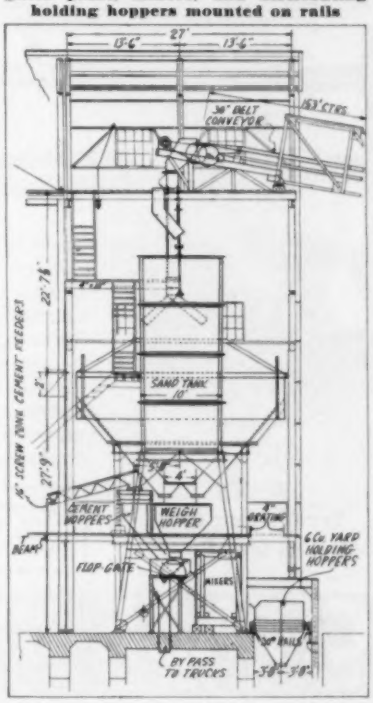


**In foreground is the cement batcher, followed by the aggregate batcher and the siphon water tank to the right. Note pneumatic vibrator on cement hopper**

**Elevation showing rotating chutes to handle aggregates to bin storage, weigh hoppers, and mixers**




**Showing conveyor from adjacent aggregates plant, mixers, and distributing holding hoppers mounted on rails**



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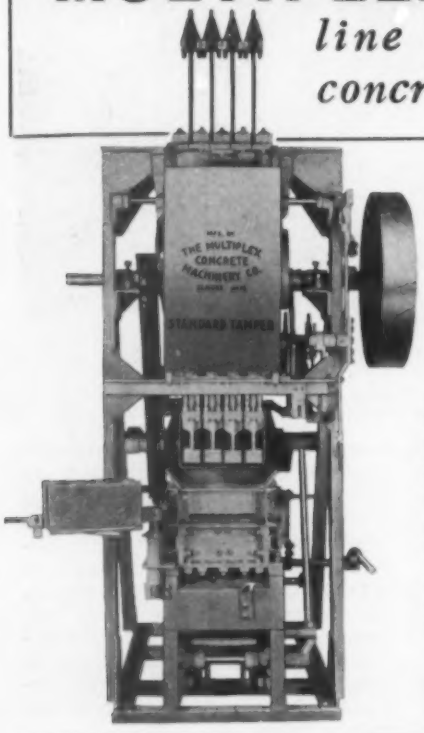
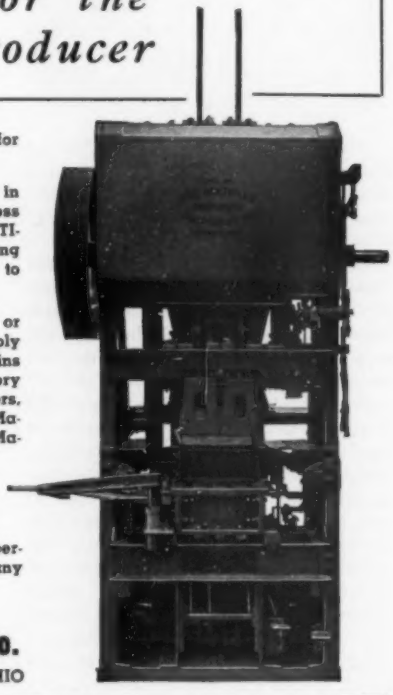



MULTIPLEX makes the ideal equipment for every concrete products purpose.

Neither time nor effort was spared in making this equipment to give faultless performance under all conditions. MULTIPLEX engineers have overlooked nothing that could add stamina or economy to concrete products operations.

Whether you want a single small unit or a complete plant, MULTIPLEX can supply your wants. The MULTIPLEX line now contains over twenty models with a machine for every purpose: Hand Machines, Double Strippers, Single Strippers, Tile Machines, Flue Block Machines, Random-Ashlar Machines, Brick Machines, Molds, Forms, Power Machines, Power Presses, Power Tampers, Power Strippers, Super Tampers, Mixers, Cars and Racks.

Be sure to check MULTIPLEX features, performance, and service before you buy any new equipment. Write for details.



**Multiplex Concrete Machy. Co.**
ELMORE . . . . . OHIO

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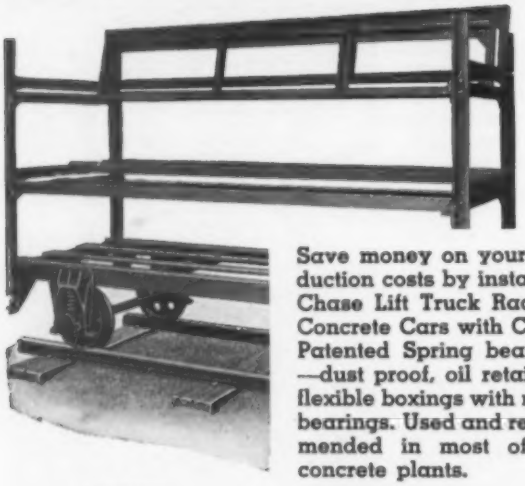
# LOW INITIAL COST
## LOW MAINTENANCE COST



Save money on your production costs by installing Chase Lift Truck Rack or Concrete Cars with Chase Patented Spring bearings —dust proof, oil retaining flexible boxings with roller bearings. Used and recommended in most of the concrete plants.

**WRITE**
For Catalog and Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

**CHASE** DRYER CARS & TRANSFER CARS
CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

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*Concrete Products Manufacturers*

## DON'T MISS YOUR CONVENTION

*at the*

**MAYFLOWER HOTEL**
Washington, D. C.

**February 12, 13 and 14**

National Concrete Masonry Association

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Cast Stone Institute

These three great days—full of sales and merchandising ideas, new methods and devices that will increase efficiency and lower costs—make one of the finest investments possible for yourself and your organization.

low, and is ready for the next batch. The cement hopper and chute have small pneumatic vibrators attached to facilitate complete discharge. These vibrators, furnished by Snow-Galgani Co., San Francisco, Calif., are set in motion by a push button pressed by the operator to expedite the cement discharge.

The mixers, each driven by a 50-hp. motor, are operated 40 to 60 seconds to pre-shrink each mix. It is then dropped through a pneumatically-operated chute, also by the same operator, into 6-cu. yd. steel hopper cars. Several batches are required for each truck load since most of the trucks haul 6-cu. yd. of concrete. These cars, on rails, are spotted over the several runways by limit switches on cable-controlled winding hoists. A push button releases the charge into the truck mixer. Further mixing takes place in the 6-cu. yd. truck mixers, 27 of which operate out of the plant. These mixers normally would be rated at 4-cu. yd. as transit mixers.

To further expedite and simplify operations, in addition to the controls at the operator level. the material man on the top floor has switches for solenoid-actuated air valves to release material from any dead storage bin for transference to the concrete plant. A 60-cu. ft. Ingersoll-Rand compressor delivers air for the batching operations.

A 6-cu. yd. load of concrete requires just 20 seconds for placement in a truck mixer, and about 4½ minutes is needed to mix 6 cu. yd. of concrete, which involves three complete batching cycles. When 500 cu. yd. or more concrete is to be delivered in one day two operators handle the batching, otherwise one side of the plant only is operated. Several of the yard men have become familiarized with the system so that experienced relief help is always handy.

### Intercommunicating System

Aside from new methods of batching, Pacific Coast Aggregates has other features that are labor and time saving. To eliminate needless climbing of stairs or ladders by the men, a Bodinson "Man-Lift" elevator has been installed which has a vertical lift of 67 ft. and travels at 80 f.p.m. It is operated by pull cord and has automatic braking devices to insure safety.

Another handy way of coördinating operations and speeding up the handling of orders is the use of a two-way Voycall system of loudspeaker communication connecting all operating locations with a centrally-located dispatch office. By use of this system, a truck operator can quickly ask for instructions and be told when to go to a particular discharge point and where; the dispatcher tells the mixer operator what the mix is to be and quantity. Similarly, the dispatcher can control by loudspeaker the handling of aggregates at the siding and can quickly learn by return message when materials are needed, etc. In noisy locations a siren is used to call the man to his speaking post. Speakers are located in the warehouse, the yard, the office, the shop, on the top floor of the concrete plant and at two places on the mixing floor. To save further steps, and time, a Lansom pneumatic tube system has been installed with four outgoing tubes from the dispatcher's office and one return for exchanging written communications and orders so that the truck driver need not leave his truck. The plant is of reinforced concrete and structural steel.

### Provision for Dry Batched Material

Probably 99 percent of all concrete delivered from this plant is central mix, but an auxiliary spout is provided adjacent to each charging spout so that batched dry material could be by-passed the plant mixers into truck mixers to be mixed in transit. This arrangement will seldom be used but serves to illustrate the completeness of thought in designing the plant.

Truck mixers are of both the side dump and end dump types, Blaw-Knox and Jaeger, on trailers, and 10 new Smith mixers of 4-cu. yd. capacity each mounted on International trucks. A. K. Humphries is president of Pacific Coast Aggregates, E. J. Goodpastor is vice-president and general manager. The company's operating department, under the direction of E. B. Kendall, operating manager, designed the plant and supervised its construction.

## Increase in Home Building in 1940

AT THE RECENT United States Chamber of Commerce conference on the construction industry, Thos. S. Holden, vice-president of the F. W. Dodge Corp., expressed the opinion that in 1940 there would be a 16 percent increase in commercial building, a 41 percent increase in manufacturing construction, a 5 percent gain in private residential building, and a 65 percent increase in public residential building. Heavy engineering construction is estimated at practically the same total as for 1939.

## Patent Suit Affecting Concrete Mixes

MASTER BUILDERS Co., Cleveland, Ohio, recently filed a patent infringement suit against the Truscon Laboratories, Inc., Detroit, in the federal court for infringement of patent 2,127,451 that relates to agents which have the effect of plasticizing concrete and mortar mixes while reducing the water-cement ratio.

## Scientific Concrete

R. E. ROBB, formerly associated with Scientific Concrete Service Corp., Washington, D. C., has formed his own organization to provide this service. Mr. Robb has developed, in coöperation with the scale company, a hopper scale equipped with a printing attachment whereby every weight will be automatically printed on a ticket, tape or both. If desired this will give the dry weight of each aggregate, the damp weight, the gross weight of water and the net weight in the water tank. The new service will embrace a survey in which the following information will be obtained: determination of the specific gravity of all aggregates used; sieve analysis of all aggregates; analysis of present mix formulas; and the design of concrete mixtures.



## Develop New Block

L. M. CASTOR, San Angelo, Texas, has developed a low cost concrete block which he has given the trade name of Cast-Crete. The block is said to be designed for hollow walls and of thicknesses required for any building. Mr. Castor has been in the concrete business for 25 years.

THE HAWARDEN CEMENT BLOCK & TILE Co., Hawarden, Iowa, has contracted this year for the construction of 20 concrete stave silos and four concrete stave corn cribs. This company also makes concrete blocks.


## Enlarge Greystone Quarry

RALEIGH GRANITE CO., a subsidiary of the Southern Aggregates Co., will increase its capacity at the Greystone quarries near Henderson, N. C. An upturn in building projects and paving work has necessitated improvements in the plant. The Southern Aggregates Corporation has lately been reorganized following a lengthy court battle over the properties, and the company is said to be in better position than ever to meet demands for its products.

## Rapid Progress on Permanente Cement Mill

WORKING DAY AND NIGHT, 200 men are rapidly completing construction of the new Permanente Cement Corporation plant near San Jose, Calif., so that cement can be made soon after the first of the year. The quarry is now in operation furnishing "sugar rock" and building up a new storage pile for cement mill raw materials. Kilns have been erected, conveyors installed, and the mill buildings are nearing completion. The 27 cement silos, 30-ft in diameter and 90 ft. high and with walls 9-in. thick for 20 ft. and from thereon 7-in. thick to the top, have been completed. The roof slab of the silos is 6-in. thick. In building the silos, wall forms were used in sections 4 ft. high and arranged to be jacked up a few inches at a time so that form movement was almost constant while pouring was continuous with three shifts daily.

## "Open House" at Easton

EASTON CAR & CONSTRUCTION CO., Easton, Penn., recently celebrated its second "Open House," to which 100 guests and the employes and their families were invited. Engineers employed by the company acted as guides and took the visitors through the plant, explaining fabrication and manufacturing details. Later, the guests were taken on an inspection tour of the office and engineering departments. Moving pictures, including those of the summer annual employes picnic, and several reels of action pictures showing actual use of company equipment in the field were displayed.

So popular has the "Open House" idea become that it will undoubtedly become a regular event with this company as it serves to bring all the employes and their families together and acquaint them with the activities of the concern. It also affords an opportunity for leading citizens to learn about the work of this company, and college students taken through the plant secure a visual education of manufacturing procedure.

## Gypsum Shows Gain of 29 Percent

BUREAU OF MINES reports that production and sales of gypsum and gypsum products during the third quarter of the year are considerably higher than for the same period in 1938. Gains of 29 percent in both crude supply and tonnage of calcined gypsum were shown in this quarter as compared with the same quarter in 1938. The value of all gypsum products sold or used during 1939 probably will be higher than in any other year since 1929, chiefly due to the increased sales of gypsum lath. Total square feet of lath for the third quarter amounted to 342,060,119 as against 251,763,708 for the similar period in 1938, a gain of 36 percent.

## Dolomite Plants Busy

THE VALLEY DOLOMITE CO., Bonne Terre, Mo., is working full capacity trying to keep ahead of demands from the steel industry. All three of the kilns are in use with a total capacity of 280 tons. The Granite City, Ill., plant, which has not operated since the fire 18 months ago, also has been opened up.

## Pacific Coast Cement Mills Seek Panama Business

CEMENT COMPANIES on the Pacific Coast are making a strong bid for Panama Canal Zone business, and have addressed a letter through the Pacific Coast Cement Institute to all California's representatives and senators urging passage of federal legislation designed to give this section of the country an even basis with eastern plants in bidding for the canal zone's cement supplies.

## May Increase Capacity of Puerto Rico Cement Mill

A LOAN OF $700,000 is being sought by the Insular Reconstruction Administration of Puerto Rico to increase the productive capacity of the cement plant completed last year. The corporation, capitalized at $1,350,000 and at present turning out 1000 bbl. of cement daily, believes that the island's demand justifies the increase.

## Sandusky Allows Use of Stone and Lake Gravel

SANDUSKY, OHIO, has amended its sidewalks ordinance permitting the use of crushed limestone or lake gravel as aggregate in the concrete. The amendment was ordered by the City Commission after a contractor complained he had been stopped by City Manager Wagar while constructing a sidewalk in which lake gravel was being used.

Employes of the Easton Car & Construction Co., Easton, Penn., at the annual summer picnic

# FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

| | | |
|---|---|---|
| Alpha Portland Cement Co. | $ .25 | Dec. 21 |
| Basic Dolomite | .25 | Dec. 15 |
| Calaveras Cement Co., pfd. (Brings 1939 total to $6) | 3.00 | Dec. 15 |
| Lehigh Portland Cement Co., pfd. | 1.00 | Jan. 2 |
| Lone Star Cement Co. | .75 | Dec. 22 |
| Michigan Silica Co., extra | .05 | Dec. 23 |
| Monolith Portland Cement Co., pfd. | .50 | Dec. 15 |
| U. S. Gypsum Co. | .50 | Dec. 30 |
| U. S. Gypsum Co., extra | 1.50 | Dec. 23 |
| U. S. Gypsum Co., pfd. | 1.75 | Jan. 2 |
| Westvaco Chlorine Prod. | .25 | Dec. 1 |
| Westvaco Chlorine Prod., extra | .60 | Dec. 1 |

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PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reports a consolidated net profit of $139,957 for the three months ended September 30, compared with $102,871 for a similar period in 1938. Net profit is figured after depreciation, depletion, interest and Federal income taxes. Earnings for nine months in 1939 are $378,270 against $276,189 for the same period in 1938.

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PEERLESS CEMENT CORP., Detroit, Mich., showed earnings of $266,997, before Federal income taxes, for nine months in 1939 as against a deficit of $15,220 for a similar period in 1938. For the last quarter ending September 30, 1939, the net profit was $169,370 as compared with $60,644 for a like period in 1938.

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CONSTRUCTION AGGREGATES CORP., Chicago, Ill., is the name of the reorganized sand and gravel company with extensive properties in Michigan and Chicago which is taking over the assets of the Construction Materials Corporation. The plan was put into effect as of October 1, 1939. Capitalization of the new company consists of $145,000 10-year s. f. 6 percent cumulative income notes (callable at any time at par); $39,000 4 percent promissory notes due $13,000 in each of the years 1940-42; and 100,000 shares of $1 par common stock.

•

LONE STAR CEMENT CORP., New York, N. Y., reported consolidated earnings for the three months ending September 30, for 1939 and 1938, and also for the nine-month period:

| | 1939 | 1938 |
|---|---|---|
| Sales | $ 5,832,495 | $ 5,636,551 |
| Mfg., etc., costs | 2,934,460 | 3,055,171 |
| Sell. exp. etc. | 695,481 | 682,478 |
| Depr. & depl. | 767,203 | 728,876 |
| Operating profit | 1,435,351 | 1,170,026 |
| Other income | 50,437 | 55,657 |
| Total income | 1,485,788 | 1,225,683 |
| Fed. taxes, etc. | 315,402 | 278,903 |
| Misc. charges | 203,184 | 141,195 |
| Net profit | 967,202 | 805,585 |
| 9 mos. to Sept. 30: | | |
| Sales | $15,861,583 | $15,432,151 |
| Mfg. etc., costs | 8,128,631 | 8,260,975 |
| Sell. exp. etc. | 1,967,078 | 1,949,711 |
| Depr. & depl. | 2,094,656 | 1,929,684 |
| Operating profit | 3,671,218 | 3,291,781 |
| Other income | 155,618 | 149,962 |
| Total income | 3,826,836 | 3,441,743 |
| Fed. taxes, etc. | 806,717 | 720,115 |
| Misc. charges | 543,198 | 392,672 |
| Net profit: | | |
| March quarter | 586,058 | 726,237 |
| June quarter | 923,661 | 797,134 |
| Sept. quarter | 967,202 | 805,585 |
| 9 months | $ 2,476,920 | $ 2,328,956 |

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NATIONAL GYPSUM CO., Buffalo, N. Y., recently sold privately to several insurance companies an issue of $5,000,000 sinking fund 3⅞s debentures. The issue is dated Sept. 1, 1939 and matures Sept. 1, 1954, but is callable at any time on at least 30 days' notice at 104 prior to Sept. 1, 1940, with reductions of ¼ percent on

Sept. 1, 1940 and on each Sept. 1 thereafter to Sept. 1, 1951, inclusive, and on and after Sept. 1, 1952 and prior to Sept. 1, 1953 at 100½ and on and after Sept. 1, 1953 and prior to maturity at 100. It is also callable at any time for the sinking fund at 100. After Dec. 31, 1939, the company will pay no dividends on any class of stock in excess of amount available for dividends and only if after giving effect thereto; (a) consolidated current assets are at least 250 percent consolidated current liabilities and (b) consolidated net current assets are not less than the greater of 60 percent of consolidated funded indebtedness or $3,000,000. Dividends on preferred, other than preferred issued as a stock dividend, may be paid without regard to "amount available for dividends." "Dividend" is defined to exclude dividends payable in stock but to include disbursements.

While the National Gypsum Company is making no definite plans for further additions in the near future, it is considering eventual expansion into Canada and the Pacific Coast, according to a statement in New York attributed to President Melvin H. Baker.

## OBITUARIES

RALPH S. WEAVER, president of the Allentown Portland Cement Co. and Valley Forge Cement Co., Catasauqua, Penn., died October 27. Born at Jersey Shore, Penn., he was 67 years of age at the time of his death. About 1903 he became treasurer of the Fuller Engineering Co. and thereafter associated with the late Col. J. W. Fuller until his death in 1929 as secretary, treasurer and vice-president of the Lehigh Pulverizer Mill Co., Fuller Lehigh Co., Allentown Portland Cement Co. and Valley Forge Cement Co. After Col. Fuller's death he became president of Allentown Portland Cement Co., Valley Forge Cement Co., and Willow Rock Co., and acted as treasurer of the Fuller Co. and Separation Process Co. He also had been active in the affairs of the Portland Cement Association for the past 30 years, during which time he served on many of their committees, and for a period of years was a member of the Board of Directors.

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I. J. SAUVEY, superintendent of the Marblehead, Ohio plant of Kelley Island Lime & Transport Co., died November 2 at the age of 63. He was born near Marblehead and spent his entire life there. In 1920 he was made superintendent of construction of the Kelley Island Marblehead plant and four years later was made superintendent.

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E. L. YATES, for many years superintendent of the Kickapoo Sand and Gravel Co., Williamsport, Ind., died October 23 at the age of 75.

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ROBERT G. ZADER, general foreman of the Whitehall Cement Manufacturing Co., Cementon, Penn., died November 1. He was 61 years of age.

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WILLIAM F. KOENIG, owner of William F. Koenig Co., concrete products manufacturing concern of Cincinnati, Ohio, died October 17 at the age of 66.

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CARL ROLAND YANSON, vice-president and director of the Ohio Cut Stone Co. and the Cleveland Quarries Co., Cleveland, Ohio, died October 18, in New York City. He was 53 years of age.

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REGINALD F. RICHARD, general manager of the phosphate division of Monsanto Chemical Co., St. Louis, Mo., died October 25, after an illness of several months.

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DR. WALDEMAR LINDGREN, internationally distinguished geologist and for many years head of the department of geology of the Massachusetts Institute of Technology, died November 3 at the age of 79.

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I. V. AUSTIN, treasurer of the Forrest County Gravel Co., Hattiesburg, Miss., died September 21 at the age of 63.

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MARK C. WIBLE, superintendent for the Central Pennsylvania Quarry, Stripping and Construction Co., Hazleton, Penn., died October 29.

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DR. CHARLES L. NORTON, director of the Department of Industrial Coöperation at the Massachusetts Institute of Technology since 1921 and widely known as an inventor and engineer, died September 8 at the age of 69. He held more than one hundred American and foreign patents relating to the economies of heat and the diminution of fire-loss. He was a director of many corporations and the founder of the Norton Laboratories in Lockport, N. Y. Among his inventions is the homogeneous method for the manufacture of Asbestos-cement materials, the method by which Johns-Manville Corp., makes its Transite building materials.

## New Rock Wool Plant Starts Operation

THE CARNEY ROCKWOOL CO., Mankato, Minn., recently started operations following a grand opening on October 25 to which the public was invited. Designed to accommodate three large cupolas and 50-ft. long blowing chambers for full capacity, the plant was placed in operation with only one cupola and one blowing chamber. The capacity of the plant with the single production unit is 3600 tons of rock wool annually, according to H. E. Carney, Jr., president. Waste rock from the cement company quarries is used in rock wool manufacture.

**At the opening of The Carney Rockwool Company's new plant. Left to right: Harry E. Carney, Jr., president; Wm. B. Oglesby, chief chemist, and C. V. McKinney, chief engineer and plant superintendent**

## More Storage for Universal at Hudson

UNIVERSAL ATLAS CEMENT CO. has let a general contract to James Stewart & Co. for a 150,000-bbl. capacity silo building at the Hudson, N. Y., plant. The building will contain 14 separate bins, and will be 100 ft. high.

## Fiftieth Anniversary for Universal Atlas

UNIVERSAL ATLAS CEMENT CO., New York, N. Y., celebrated its Golden Anniversary in November this year. During these 50 years the company originated a number of fundamental improvements in the manufacture of cement and pioneered in important developments in its use. A predecessor unit of the Universal Atlas Cement Co. was the first to use and develop the rotary kiln. It was the first to make commercial use of powdered coal in the production of clinker, and was the first to use plaster of Paris to regulate the setting time of portland cement. Another form of the same material, gypsum, is now universally used. It also is credited with being the first to develop in this country the use of granulated blast furnace slag instead of clay or shale in the manufacture of portland cement.

## Attorney General Attacks Illegal Restrictions

IN A LETTER to the secretary of the Central Labor Union of Indianapolis, Ind., Assistant Attorney General Thurman Arnold outlined his policy with respect to anti-trust charges in the building and construction field. He listed five types of illegal restraints: 1. To prevent the use of cheaper material, improved equipment or more efficient methods; 2. To compel hiring of useless and unnecessary labor; 3. To enforce a system of graft and extortion; 4. To enforce illegally fixed prices; 5. To destroy an established and legitimate system of collective bargaining as when one union makes war on another union by attacking employers who deal with that union.

## New River Towboat for Marquette

"NICHOLAS DUNCAN" is the name of the Diesel-powered towboat recently placed in service by the Marquette Cement Manufacturing Co., Chicago, Ill. The boat is named in memory of the late chairman of the board of the company, Nicholas W. Duncan. For the present, the boat will be engaged in towing barges of coal from East Liverpool, Ill., to the La Salle plant of the company. Later, the boat will be used to tow barges loaded with cement and supplies for the company's plants at La Salle, Ill., on the Illinois River and Cape Girardeau, Mo., on the Mississippi River.

It is 130 ft. long with a 28-ft. beam, powered with two Atlas Imperial Diesel motors developing over 800 hp., and is driven by two screw propellers. The speed of the boat is 10 to 14 m.p.h.

## Cement Statistics For Nine Months

SHIPMENTS of finished portland cement ran ahead of production in every month of 1939, with the exception of June, the rise in shipments over production being particularly noticeable in April, May, July, and August, and then running nearly parallel in September and October.

The Bureau of Mines reports that the portland cement industry in October, 1939, produced 12,538,000 bbl., shipped 12,830,000 bbl from the mills, and had in stock at the end of the month 19,868,000 bbl. Production and shipments of portland cement in October, 1939, showed increases, respectively, of 8.5 and 3.8 percent, as compared with October, 1938. Stocks at mills were 3.4 percent lower than a year ago.

Mill value of shipments, 92,528,000 bbl., in the first nine months of 1939, is estimated as $136,858,000. Shipments totals for the first nine months of 1939 include approximately 2,680,000 bbl. of high-early-strength portland cement with an estimated mill value of $5,031,000.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 162 plants at the close of October, 1939, and of 161 plants at the close of October, 1938.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

| | October 1938 | 1939 | Sept. 1939 | Aug. 1939 | July 1939 |
|---|---|---|---|---|---|
| The Month | 52.9 | 57.2 | 56.3 | 56.6 | 57.9 |
| 12 Months | 40.2 | 46.3 | 45.9 | 45.5 | 45.0 |

## Concrete Pavement Yardage

AWARDS of concrete pavement for October, 1939, have been announced by the Portland Cement Association as follows:

| Type of construction | Sq. Yds. awarded during Oct. | Total Sq. Yds. during first ten months |
|---|---|---|
| Roads | 1,067,489 | 23,976,026 |
| Streets and Alleys | 1,587,548 | 16,295,654 |
| Airports | 93,228 | 726,104 |
| Totals | 2,748,265 | 40,997,784 |

### Northern Pacific Sells Sand and Gravel Pit

NORTHERN PACIFIC RAILWAY has sold a large gravel pit at Ames Siding between French and Foxhome, Minn., to Jos. A. Dorn of Wahpeton, Minn. There are approximately 5½ acres of land involved in the deal, and the pit is said to be one of the largest in the State.

### Railroad to Reopen Abandoned Sand Pit

GREAT NORTHERN RAILROAD is now constructing a spur track to a large sand and gravel pit near Clarissa, Minn., which had been abandoned for more than 30 years. Tests recently made indicate a very large remaining deposit of excellent quality. The old pit has been filled in with topsoil stripped from the site of the new pit.

### Michigan Quarry Improvements

THE WAKEFIELD CRUSHED STONE Co., Wakefield, Mich., has improved its plant by the addition of new screens and a modern washing unit. Speeds of screens have been reduced to obtain a better grading of stone. Local reports state that the plant is now operating at capacity.

### Lime Concern Reorganizes

CHESTER VALLEY LIME Co., Paoli, Penn., is planning to reorganize under Section 77-B of the Bankruptcy Act. On September 28 the company presented a petition to the District Court for leave to withdraw the proposed plan of reorganization filed with the court on December 9, 1936, because of its infeasibility and to submit a new plan of reorganization.

### Idaho Grange to Form Phosphate Company

THE IDAHO STATE GRANGE has formed a corporation to prepare phosphate rock for agricultural purposes. Initial efforts will be mainly experimental. If the tests by farmers indicate that ground raw phosphate rock can be used successfully as a fertilizer, a large plant will be built.

### Bulk Cement Cars

ONE HUNDRED 70-ton bulk cement, hopper cars are to be built for the Reading Railroad and the Central Railroad of New Jersey, divided equally between the two companies.

### Block Plants Are Busy

CEMENT PRODUCTS Co., Savannah, Ga., a new plant which opened this year, has been working at top speed to produce 300,000 masonry units for a federal housing project. According to A. W. Harrell, president and general manager of the company, the plant is producing about 5000 units per day to meet orders. Superock aggregate is used.

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BALTIMORE CONCRETE PRODUCTS Co., Baltimore, Md., has plans for a one-story building, 32- x 96-ft., to take care of expanding business.

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CAPE FEAR CONTRACTING Co., Fayetteville, N. C., is now manufacturing concrete block, having purchased a Stearns Joltcrete.

### Ready Mixed Plants Are Active

VIRGINIA SAND AND GRAVEL Co., Charleston, W. Va., has been very active this year in the sale of ready mixed concrete, principally in street paving and school work. Three new 4-cu. yd. Rex mixers mounted on International trucks are now operated in addition to eight smaller ready mixed concrete trucks.

•

ROSS CONCRETE & MORTAR, INC., Huntington, W. Va., has been busy on a number of large jobs this year calling for ready mixed concrete. The plant has a daily capacity of 400 cu. yd., and is equipped with heating facilities for winter operation. A laboratory is maintained for testing purposes and the preparation of different mixes.

## Place Order for World's Longest Conveyor

COLUMBIA CONSTRUCTION CO., Redding, Calif., erecting the large sand and gravel plant to supply nearly 10,000,000 tons of aggregates for Shasta dam, has placed an order with the Goodyear Tire & Rubber Co., Akron, Ohio for belting to be used on 9.6 miles of conveyors which will transport the aggregates to the damsite. Idlers equipped with Timken roller bearings will be supplied by the Chain Belt Co., Milwaukee, Wis. There will be 26 flights of conveyors, each of which will be motivated with 200 h.p. of electric motors, except for three down-grade conveyor flights which will generate power. The capacity of the system will be 1100 tons per hour while conveying at a speed of 550 ft. per minute.

## Court Injunction Against California Price War

ROCK AND SAND PRODUCERS, INC., a voluntary organization of aggregates producers in California, recently secured an injunction from Superior Judge Emmet H. Wilson at Los Angeles, Calif., against 34 firms which, it is alleged, have been selling below cost in violation of the Unfair Practices Act. It was charged that gravel was being sold and delivered by some concerns for 76c a ton although the cost of the material was 38c, and delivery cost was 76c.

## Sand Lime Brick Production and Shipments

NINE ACTIVE sand-lime brick plants reporting for October and nine for September, statistics for which were published in November.

AVERAGE PRICE FOR OCTOBER

| | Plant Price | Delivered Price |
|---|---|---|
| Milwaukee, Wis. | $10.00 | $12.00 |
| Saginaw, Mich. | 10.90 | .... |
| Seattle, Wash. | 14.50 | 16.50 |
| Syracuse, N. Y. | 14.00 | 16.00 C/L<br>20.00 L/C |

STATISTICS FOR SEPTEMBER AND OCTOBER

| | September† | October‡ |
|---|---|---|
| Production | 2,056,520 | 2,048,795 |
| Shipments (rail) | 409,000 | 338,000 |
| Shipments (truck) | 1,974,915 | 2,198,962 |
| Stock on hand | 550,376 | 620,665 |
| Unfilled orders | 990,000 | 635,000 |

† Nine plants reporting: incomplete, one not reporting production, four not reporting stock on hand, and four not reporting unfilled orders.

‡ Nine plants reporting: incomplete, one not reporting production, four not reporting stock on hand, and six not reporting unfilled orders.

## PRICES BID
## Contracts Let

FORD CITY, PENN.: J. L. C. Welch and Clarence Heilman submitted low bid to U. S. Engineers at Pittsburgh for delivery of 1080 tons of gravel to the Crooked Creek Dam site. Their bid was 90c per ton.

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LORAIN, OHIO: Contracts have been awarded for the county's contribution to repaving of State Route 18. Awards were made to Braun Builders' and Supply Co., Lorain, for 1858 bbl. of cement at $1.88 per bbl., and to Wellington Grain and Milling Co., Wellington, for 2608 tons of slag at $1.49 per ton.

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PITTSBURGH, PENN.: City contracts for sand and gravel have been awarded to the Pittsburgh Gravel Co. for zones 1 and 2 with a bid of $1.80 and $1.85 a ton for sand and $1.50 and $1.55 for gravel; the Iron City Sand and Gravel Co. for zone 3 with a bid of $1.40 and $1.50 a ton for gravel and $1.70 to $1.80 a ton for sand; the Dravo Corp. with a bid of $1.71 for gravel and $2.01 for sand in carload lots; and Iron City Sand and Gravel Co. with a bid of $1.66 a ton for gravel and $1.96 for sand to be delivered in carload lots.

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SELLERSBURG, IND.: Ready-Mix Concrete, Inc., New Albany, Ind., has been awarded a contract totaling $125,000 to supply concrete for the sea wall at Tell City. The company is erecting a plant at the job to supply the concrete. A total of 17,000 cu. ft. of concrete, making the award at $7.35 per cu. ft., will be used.

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WALLA WALLA, WASH.: Walla Walla Concrete Pipe Co. was awarded a contract for 21,000 concrete brick at $20 per thousand to be used in installing a sanitary sewer project in the northwest part of the city.

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MUSCLES SHOALS, ALA.: Carl Gilbreath, Columbia, Tenn., will supply approximately 10,000 tons of washed lump brown rock phosphate for use in TVA chemical engineering work at $3.31 per ton.

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ST. LOUIS, MO.: Bids were submitted for 400 cu. yd. of wet mixed concrete for the city water department. The lowest were submitted by the General Materials Co., and the Contractors' Material Co., at $7.90 a cu. yd.

## Minerals Yearbook Out

"MINERALS YEARBOOK, 1939," published by the Bureau of Mines, Department of the Interior, is now off the press. Through the years, this annual economic and statistical summary of the mineral industry of the United States has been looked upon by the rock products industry as one of the essential compendiums of information for ready reference. The 1939 volume reviews current trends in production, consumption, prices, stocks, technologic progress, world conditions, and international trade for nearly 100 metal and mineral commodities. Under the building materials group, cement, stone, sand and gravel, gypsum, lime and clay products, the Yearbook estimates about a 10 percent lower output in 1938 as compared with 1937, although total slate production was slightly higher owing to increased demand for granules. This decline, however, compares with a total of 15 percent for all minerals, and a drop of 22 percent for all industry, according to the index of the Federal Reserve Board.

# Traffic and Transportation

*PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of October 18:*

## Central

59905. Establish on (a) sand, naturally bonded moulding, in all kinds of equipment, C. L.; sand (except industrial), in closed equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L.; (c) sand (except industrial) in open top equipment, C. L., also on gravel, from Phalanx, Ohio, in open top equipments, C. L. (See Note 6): from M. & S. V. Group to destinations in Pennsylvania, in cents per 100 lb. as follows: Bairdford, (A) 165, (B) 172, (C) 143; Conneaut Lake Park (A) 132, (B) 145, (C) 121; Indianola (A) 165, (B) 172, (C) 143; Linesville, (A) 132, (B) 145, (C) 121; Liberty, (A) 165, (B) 172, (C) 143; Muse (A) 165 (B) 172, (C) 143; North Star, (A) 165, (B) 172, (C) 143; Atlasburg, (A) 165, (B) 172, (C) 143; Atlantic Colliery No. 2, (A) 176, (B) 194, (C) 154; Bitner Colliery, (A) 176, (B) 194, (C) 154; Bute (A) 176, (B) 194, (C) 154; Cecil (A) 154, (B) 169, (C) 132; Dunbar, (A) 176, (B) 194, (C) 154; End Andrews Run Br., (A) 165, (B) 172, (C) 143; End Baileys Run Br., (A) 154, (B) 169, (C) 132; End Blairsville Br., (A) 176, (B) 194, (C) 154; End Lyons Run Br., (A) 165, (B) 172, (C) 143; End Pucketa Br., (A) 154, (B) 169, (C) 132; End Streets Run Br., (A) 154, (B) 169, (C) 132; End Tearing Run Br., (A) 176, (B) 194, (C) 154; End Unity Branch, (A) 176, (B) 194, (C) 154; End Yellow Creek Br., (A) 176, (B) 194, (C) 154; Gould Colliery, (A) 165, (B) 172, (C) 143; Kyle Colliery, (A) 187, (B) 206, (C) 165; Lincoln Colliery, (A) 176, (B) 194, (C) 154; Mutual, (A) 165, (B) 172, (C) 143; Ontario Colliery, (A) 165, (B) 172, (C) 143; Royal Colliery, (A) 176, (B) 194, (C) 154; Seehart Colliery, (A) 165, (B) 172, (C) 143; Slickville, (A) 165, (B) 172, (C) 143; So. Union Colliery No. 1, (A) 187, (B) 206, (C) 165; Wynn Colliery, (A) 187, (B) 206, (C) 165; Yukon Colliery, (A) 165, (B) 172, (C) 143; Yough Colliery, (A) 165, (B) 172, (C) 143; Coverdale, (A) 154, (B) 169; (C) 132; Pittsburgh West End, (A) 143; (B) 157, (C) 132.

59939. Establish on crushed slag or crushed commercial slag (other than granulated), in open top cars, C. L. Hamilton, Ohio, to Highland, Ohio, 105c per net ton, via B. & O. R. R. direct.

60054. Establish on limestone, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., McVittys, O., to Cleveland, O., 176c per net ton.

60083. Establish on sand, all kinds, and gravel, in open top cars, Gravel Pit, Ohio, to Ohio points, viz.: Albany, 105c; Athens, 99c; Brokaw, 94c; Burr Oak, 88c; Carrington, 99c; Cheshire, 116c; Corning, 88c; Drakes, 99c; Eagleport, 83c; Gallipolis, 127c; Glouster, 94c; Grosevener, 99c; Hartleyville, 94c; Hobson, 116c; Langsville, 110c; Lowell, 105c; Malta (McConnelsville), 88c; Marietta, 110c; Millfield, 94c; Pomeroy, 116c; Sayre, 83c; Shawnee, 99c; Stone, 77c; Tatmans, 88c; Trimble, 94c; Tropic, 77c; Waterford, 99c; West Marietta, 110c net ton.

60084. Establish on sand, all kinds, and gravel, Beaver, Ohio, to destinations in Ohio, rates in cents per net ton as follows: To representative points — Alvordton, 162; Ansonia, 138; Athens, 99; Barberton, 149; Bellaire, 149; Berea, 171; Carey, 149; Carrollton, 160; Castalia, 160; Chillicothe, 83; Coldwater, 160; Dillonvale, 171; Dunkirk, 149; Durbin, 116; East Fultonham, 116; East Liverpool, 171; Fire Brick, 99; Franklin (Warren Co.), 127; Gallipolis, 105; Holgate, 160; Lisbon, 182; Lowellville, 162; Martins Ferry, 160; Minerva, 160; Mingo Jct., 171; Newton Falls, 182; Ohio City, 160; Quincy, 138; Salem, 162; Struthers, 162; Sycamore, 149; Vernon, 138; Warwick, 160; Zoarville, 149.

60069. Establish on lime (calcium), carbonate of (recarbonated waste), in packages or in bulk, min. wt. 50,000 lb., Painesville and Perry, Ohio, to Yellow Springs, Ohio, 14c.

60112. Amend C. F. A. L. Tariff 218L. as follows: Page 272, Item 5603—rates on lime, Genoa, Ohio, etc., to pts. in T. L. A. territory, by providing for the addition of "Clay Center, Ohio," located on the O. P. S. Co. as a point of origin on basis of the same rates as in effect from Genoa, Ohio.

Representative proposed rates to Albany, N. Y., (a) 26; (b), 21 Boston, Mass., (a), 30; (b), 24; New York, N. Y., (a), 28; (b), 22. ("a" refers to min. wt. 30,000 lb. and "b" to min. wt. 50,000 lb.)

Page 274, Item 5633—Rates on lime, common, hydrated, quick and slaked, etc., from Genoa, Ohio, etc., to pts. in T. L. A. territory, also by providing for the addition of "Clay Center, Ohio." Representative proposed rates to Newport News, Va., (a), 25; (b), 19; Norfolk, Va., (a), 25; (b), 19; Rochester, N. Y., (a), 20; (b), 16; Rockland, Me., (a), 30; (b), 24; Utica, N. Y., (a), 24; (b), 19.

60237 (1). Establish on stone, crushed, slag or gravel, coated with oil, tar or asphaltum (See Note 7), in open top equipment, C. L., Chicago, Ill., to the following points in Michigan: (Rates in cents per net ton): Abbottsford, 333;

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Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

Attica, 283; Annpere, 283; Bancroft, 244; Beaverton, 308; Berry, 219; Bridgewater, 232; Caseville, 320; Cheboygan, 371; Clayton, 219; Coleman, 295; Crofton, 295; Detroit, 257; Elwell, 257; Fayette (Fulton Co.), Ohio, 244; Gladwin, 308; Grand Rapids, 219; Harrison, 308; Hitchcock, 320; Imlay City, 295; Ionia, 244; Lake City, 295; Lapeer, 283; Ludington, 283; Mackinaw City, 345; Manistee, 283; Monroe, 257; Mount Pleasant, 308; Muskegon, 219; Onekama, 283; Owosso, 244; Petoskey, 333; Port Huron, 308; Reed City, 257; Riga, 232; Romulus, 257; Sparta, 219; Stony Creek, 244; Tecumseh, 232; Vermontville, 244; Whitmore Lake, 244; Wilmot, 295; Wixom, 295; Ypsilanti, 244; Tuma, 295.

60328. Establish on **crushed stone**, in open top cars, C. L., Sandusky, Ohio, to Sharon Center, Ohio., 99c per net ton.

60318. Establish on **silica rock**, crushed (not ground or pulverized), in open top cars, C. L., Burnetts, Ohio, to Ambridge, Butler, Penn., 121c; Carnegie, Penn. 132c; Chicago Ill., 297c; Donora, Penn., 143c; Glassport, Penn., 132c; Mingo Junction, Ohio, 110c; Monessen, Penn., 143c; Sharon, Penn., 99c; Steubenville, Ohio, 110c per net ton.

60361. Establish on **fluorspar**, C. L., min. wt. 40,000 lb., to East Canton, Ohio, from Brookport, Golconda, Homberg, Metropolis, Ill., and Evansville, Ind., 545c per net ton; Cochrans Spur, Eichorn, Rosiclare, Steart, Ill., Cerulean, Crayne, Cridor, Fredonia, Marion, Mexico, Princeton, Ky., 578c per net ton.

60375. Establish on **crushed stone**, C. L., in open top cars, Wabash, Ind., to Niles, Buchanan, Dayton, Galien and Three Oaks, Mich., 75c per net ton.

60421. Establish on **stone, fluxing, furnace or foundry, melting or refractory (unburned)**, in bulk, C. L., Lewisburg, Ohio, to Cincinnati, Portsmouth, Ohio, 92c; Ashland Ky., 123c; Charleston, W. Va., 213c per G. T. and **limestone, crude**, C. L., Lewisburg, Ohio, to Ottawa, Ohio, 107c; Findlay, Ohio, 117c and Fremont, Ohio, 127c per net ton.

S. F. A. 4522 (carriers). **Silica (silex) sand, silica**, powdered or pulverized, C. L. Establish rate of 25c per cwt. from Spruce Pine and Minpro, N. C., to Cleveland, Ohio, and Perth Amboy, N. J.

## Trunk

Sup. 1 to 38160. **Talc tailings**, C. L.; **soapstone**, ground or pulverized, other than soapstone, testing not less than 99% through 200 mesh screen, C. L.; **soapstone**, crude, not ground or pulverized (not blocks or slabs), C. L., min. wt. 70,000 lb., from Marriottsville, Md., to Keyport, N. J., 15c per 100 lb., in lieu of current rate of 25c per 100 lb. Sup. 2 to 38160: from Conowingo, Md., to Keyport, N. J., 13c per 100 lb., in lieu of current sixth class rate of 20c per 100 lb.

38214. **Mica scrap and mica ore**, crude waste, in straight or mixed C. L., min. wt. 50,000 lb., from Glenvale and Opeongo, Ont., to Rutherford, N. J., 34c per 100 lb., in lieu of current fifth class rate of 54c per 100 lb. (See Note 5.)

38226. **Chert**, C. L., (See Note 5), from McCoy, Va., to Cincinnati, Ohio, $2.92 and Hartford, Conn. $4.02 per net ton. (See Note 5.)

38239 (increase). Cancel the following commodity rates on **crushed stone and stone dust**, C. L., in shipping containers loaded on container cars, as published in W. S. R. R. I. C. C. Ws 6991: Rates per ton of 2000 lb. From South Bethlehem, N. Y., to Hillsdale, N. Y., 99c; Mt. Kisco, N. Y., $1.43; Patterson, N. Y., $1.27; Pawling, N. Y., $1.27; Towners, N. Y., $1.27*. On crushed stone only from Marlboro to Newburgh, 66c and Walden, 99c. (See Note 4.) *Applies on crushed stone only.

## Southern

20514. Establish 75c net ton on **slag**, C. L., as described in Item 1040 of S. F. T. B. Tariff 316-B, effective with expiration of present rate, also on **paving or road surfacing material**, C. L., from Ensley to Manchester, Ala. Expires 6-30-40.

20515. **Dolomite, roasted**, C. L. Establish 451c net ton, Dolly Siding, Mo., to Knoxville, Tenn.

20529. **Gravel**, C. L. Establish from Ingleside, S. C., to Charleston, S. C., 110c; Savannah, Ga., 116c; and Jacksonville, Fla., 154c net ton.

20667. **Limestone**, ground, C. L., min. 60,000 lb. Establish 115c net ton—Austinville, Va., to D. & W. Ry. stations. Truck competitive. Expires 6-30-40.

20682. **Phosphate rock**, other than ground, C. L. Establish 200c gross ton, Florida mines in Pebble Rock district to Jacksonville, Fla. Truck competitive. Expires 12-31-40.

20702. **Phosphatic sand and clay**, C. L., min. 54,000 lb. Establish 200c net ton, Bartow and Brewster Fla., to Fort Pierce, Fla.

20716. **Slag**, C. L. Establish 187c net ton, Birmingham, Ala., and group to Yukon, Fla. Water competitive.

20717. **Sand**, C. L. Establish 70c net ton, Interlachen, Fla., to Yukon, Fla. Water competitive. Expires 12-31-40.

20719. **Gravel**, C. L. Establish 165c net ton. Montgomery, Ala., to Yukon, Fla. Water competitive. Expires 12-31-40.

20734. **Stone, crushed**, C. L. Establish 44c net ton. Frankfort and Avoca, Ky., to Shelbyville, Ky. Truck competitive. Expires 12-31-39.

20737. **Stone, crushed**, C. L. Establish 115c net ton. Blair, S. C., to Georgetown and Jamestown, S. C.

20742. **Limestone or marble**, ground or pulverized, C. L. Establish 132c net ton.

Dolcito, Ala., to Nashville, Tenn. Truck competitive. Expires 12-31-39.

20745. **Limestone**, crushed, ground or pulverized, C. L. Establish from Bessemer, Ala., to Arcadia, La., 275c; Minden, La., 264c; and Shreveport, La., 286c net ton.

20752. **Stone**, crushed, C. L. Establish 110c net ton. Camp Conrock, Fla., to Yukon, Fla. Water competitive. Expires 12-31-40.

20753. **Sand, moulding**, C. L. Establish 347c from Camden, Lipe, Sawyers Mill and Hollow Rock, Tenn., and 369c net ton from Lexington, Tenn., to North Chicago and Waukegan, Ill.

### Southwestern

18342. **Asphalt rock**, natural or coated and stone, coated. Cancel rate $6.05 per ton of 2000 lb. on asphalt rock and crushed stone from Blewett, Cline, Dabney, LaPryor, Pulliam, Uvalde and Whitesmine, Tex., to Chicago, Ill., and points taking same rate named in Item 540, SWL Tariff 20-P, and in lieu thereof establish rate of $5.45 per ton of 2000 lb. from and to these points.

18454. **Stone.** Establish a rate of $4.18 a ton of 2000 lb. on crushed stone from Lyons, Colo., to Dallas and Forth Worth, Tex.

18511. Establish rate of 93c per ton of 2000 lb. for **limestone**, crushed or ground, C. L., min. wt. as provided in Item 60 of S. W. L. Tariff 162-N, from Ft. Towson, Okla., to Hope, Ark.

18545. Establish rate of 94c per ton of 2000 lb., min. wt. as provided in Item 20 of W. T. L. Frt. Tariff 237-C, on crushed or ground **limestone**, C. L., from Ste. Genevieve, Mo., to St. Louis, Mo., via St. L.-S. F., Horine, Mo., Mo. Pac.

### Illinois

7705-4 (I. R. C.) **Fullers earth**, C. L., min. wt., in bags or in bulk, 50,000 lb., when in barrels 40,000 lb., from Olmsted, Ill., to Salem, Ill. Present: 17c per 100 lb. Proposed: $1.52 net ton.

## Gypsum Lath Rates in the South

AN I. C. C. EXAMINER has recommended that the Commission find justified a proposal of the railroads to establish reduced rates on gypsum lath between points in southern territory made 17½ percent of the first class rates currently in effect, min. 40,000 lb. Prior to publication of proposed rates which were suspended on protests of industries having plants in official, western trunk line, and southwestern territories, the report said, gypsum lath moved as a plasterboard and at the same rates as plasterboards. In fact, it said, the suspended schedules for the first time specifically named gypsum lath as a distinct commodity. The reason was the recently built plants of the National Gypsum Co., at Port Wentworth, Ga., and of the United States Gypsum Co., at Jacksonville, Fla. Owing to the relatively low levels of the intrastate rates in Georgia and Florida, it said, neither manufacturer could successfully compete with the other in the adjacent state on the interstate level of rates in effect.

# News of the Industry

**Fuller Co.**, Catasauqua, Penn., announces that J. W. Fuller is now president in place of A. E. Douglass, who resigned, P. F. Stauffer is vice-president in charge of sales, J. H. Morrow is vice-president in charge of engineering, and G. K. Engelhart is assistant to the president and patent counsel. Mr. Fuller is a son of the founder of the company.

**General Electric Co.**, Schenectady, N. Y., announces the election of Charles E. Wilson, executive vice-president, as president and Philip D. Reed, assistant to the president, as chairman of the board of directors. They will succeed Gerard Swope and Owen D. Young, who will become honorary president and honorary chairman of the board, respectively.

**Caterpillar Tractor Co.**, Peoria, Ill., announces the appointment of V. H. (Vic) Wallace as western sales manager to succeed the late H. H. Chambers. He joined the company's advertising department at San Leandro, Calif., in 1927.



**Allis-Chalmers Manufacturing Co.**, Milwaukee, has announced the passing of Ralph S. MacPherran, chief chemist for many years and identified with the iron and steel industry for nearly 50 years. He had recently retired. Harold J. Stein, research engineer of the manufacturing department, has been appointed director of research, chemistry and metallurgy of the Allis-Chalmers manufacturing department, now bringing all these activities under one head. His assistant will be J. T. Jarman.

**Chain Belt Co.**, Milwaukee, Wis., has acquired the business and all the net assets of Baldwin-Duckworth Chain Corp., Springfield, Mass. The merger of Chain Belt and Baldwin-Duckworth grew out of a selling arrangement between the two firms. For some time Chain Belt has marketed finished roller chain made for it by Baldwin-Duckworth and wished to assure itself of a permanent source of supply.

**Food Machinery Corp.**, Los Angeles, Calif., has purchased the Kimball-Krogh Pump Co., a division of the Victor Equipment Co., and will now manufacture Kimball-Krogh pumps.

## New Incorporations

**Santee Limestone Co.**, Holly Hill, S. C., has been incorporated with a capital stock of $5000. H. P. Bollinger is president and J. G. Benson is secretary and treasurer.

**Building Materials, Inc.**, is the name of a new Jacksonville, Fla., corporation. Incorporators are W. H. McCoy and E. P. Mulcahy.

**Pioneer Potash Corp.**, has been incorporated by William D. Waldron, New York, N. Y., Robert B. Cummings, Bronxville, N. Y., and Ross H. Miner, Brooklyn, N. Y., with a capital of $100,000.

**West Lake Quarry & Material Co.**, Clayton, Mo., has been incorporated by Vertice R. Cruse and L. P. Trump. Capital is $10,000.

**Little Rock Granite Co.**, Little Rock, Ark., has been incorporated with authorized capital stock of 100 shares no par value and $10,000 paid in capital. Incorporators are R. S. Wilson and J. F. Loughborough.

**Metro Coal & Limestone, Inc.**, Canton, Ohio, has been granted a charter. Capital is 250 shares no par value and incorporators are W. Bernard Rodgers, Mildred E. Lawson, and Maurice Wendling.

**Flatt Run Quarries, Inc.**, Albany, Ohio, has been granted a charter with a capital of 150 shares no par value. Incorporators are John E. Greene, Pete C. Minotti, and D. H. Jones.

**Nagy, Inc.**, is the name of a new Toledo, Ohio company. It will handle distribution of the concrete and cinder blocks for Columbia Block & Supply Co., the parent organization. Capital is 250 shares no par value and incorporators are Joseph and John Nagy.

**Bridgeport Sand & Gravel Co.**, Swedesboro, N. J., has been incorporated with a capital of 500 shares, no par value.

**Stone-Crawford Building Material Co.**, is the name of a new Nacogdoches, Tex., corporation. Incorporators are J. E. Stone and Clyde Stone.

**Certified Concrete Corp.**, Lynchburg, Va., has been granted a charter which calls for issuance of 300 shares common stock, no par value and an issue of $20 preferred stock. R. E. Graves is president and Hubert B. Watts is secretary-treasurer. The company plans to erect a ready-mixed concrete plant.

**Active Material Co.**, Chicago, Ill., has been incorporated by S. C. Carney, Leroy O. Olmstead, and J. H. Burre, with a capital stock of 500 shares $50 par value.

# FREE ! New Literature

**THE bulletins and catalogs described below are for your benefit. To save you the necessity of writing individual letters, those you want can be obtained by merely checking and mailing the post card on this page.**

1 AFTERCOOLERS.—Pennsylvania Pump & Compressor Co. Bulletin 186 is about the design and advantages of various types of Pennsylvania aftercoolers.

2 ANTI FREEZE SYSTEMS FOR AIR LINES.—Sullivan Machinery Co. Bulletin R-16 describes several types of anti-freeze systems guaranteed to prevent freezing down to 70 degrees below zero. Tannergas is for temporary air compressor installations or where electric current is not available; Frosto is for permanent installations; and Frosto Vaporizer is for portable conveyors.

3 ARC WELDER.—Lincoln Electric Co. Bulletin 327A describes and illustrates in detail the operation and features of "Shield-Arc" type S-6055 Diesel engine driven welder which has a rating of 300 ampéres at 40 volts.

4 BRAKE DRUMS.—Climax Molybdenum Co. The Moly Matrix for September, 1939, tells about the advantages of using brake drums made of an electric furnace cast iron containing from 0.25 to 0.45 percent chromium, and 0.35 to 0.45 percent molybdenum. Also included are graphs and a table on test performances.

5 CALCIUM CHLORIDE. — Solvay Sales Corp. "Highway Ice Control — Methods, Materials and Equipment" contains a resume of present ice control practices with particular reference to the use of calcium chloride. Among the subjects discussed is that of protecting stock piles in winter and types of covers for stock piles.

6 COMBUSTION METERS AND DRAFT GAGES.—Hays Corp. Publication No. 38-297 is about Hays combustion meters. In addition it contains a concise explanation of the Orsat principle of measuring $CO_2$. Publication No. 37-294 gives information about the Hays draft gages.

7 COMPRESSORS, DRILLS AND VIBRATORS.—Chicago Pneumatic Tool Co. has issued a 56-page, profusely illustrated catalog of its complete line of compressors, rock drills, wagon drills, drifters, etc.

8 CRUSHERS.—Allis-Chalmers Mfg. Co. Bulletin B-6004 describes and illustrates a wide variety of Superior McCully crushers ranging from 2½-in. width of opening for laboratory use to the largest gyratory crushers ever built having 60-in. wide receiving openings. General dimension and capacity tables are included.

9 CRUSHERS.—F. M. Welch Engineering Service. Bulletin No. 17 contains information on specifications, uses and operation of the Greenville Impact Crusher for producing fine crushed material from larger sizes of gravel or limestone.

10 EXCAVATORS.—Osgood Co. Profusely illustrated catalog 3906 sets forth the details of construction and design which characterize the Osgood type "60" shovel, dragline, clamshell, backhoe and crane.

11 DRAGLINES.—Bucyrus-Erie Co. Bulletin DL-1 describes the mechanical and structural details of draglines in various sizes. These details are well illustrated, and quite a number of interesting views show draglines at work all over the world.

12 DUST COLLECTORS. — Allis-Chalmers Mfg. Co. Bulletin 1481 describes and illustrates with typical working views and diagrams the operation of Allis-Chalmers style "C" bag filter type dust collector. Featured is a diagram of the general arrangement of a four-compartment dust collector used in connection with a compeb mill.

13 DUST COLLECTORS. — Research Corporation and Western Precipitation Corp. Bulletin on Multiclone dust collectors and accessories contains numerous applications of the equipment. Also included is a discussion in non-technical terms of the law of cyclonic collection and tables covering the collection efficiency of the different units.

14 DUST FILTER.—W. W. Sly Manufacturing Co. has announced a small capacity, cloth bag dust filter in which has been incorporated many features found in larger equipment. The filter is described and illustrated in the New Machinery and Equipment section.

15 EXCAVATORS.—Osgood Co. Form 3907 contains operating data on the Osgood 600 1-cu. yd. excavator as well as diagrams of its operation as a shovel, dragline, clamshell, crane, hoe, etc.; and form 3908 contains the same kind of information about the Osgood 605, 1¼-cu. yd. unit.

16 DUST COLLECTING. — American Air Filter Co., Inc., Volume four of Dust Engineering describes the operation and efficacy of some of the latest AAF models. These are the Electro-Matic air filter, which combines electrical precipitation with automatic air filtration; Type F Roto-Clone serving as an induced draft fan and fly ash collector; and Cycoil oil bath air cleaner.

17 ENGINES.—Waukesha Motor Co. has issued two folders describing the performance, features and economy of Waukesha Multi-fuel engines.

18 EXCAVATORS.—Bucyrus-Erie Co. has issued a new 32-page bulletin PBE 33-B-3 describing modern improvements in the Bucyrus-Erie 33-B, 1¼ yd. shovel, dragline, clamshell, crane. Mechanical and structural details are fully explained and clearly illustrated by the use of many excellent close-up photographs.

19 EXCAVATORS.—General Excavator Co. Bulletin 3920 presents in a novel and interesting manner the twin disc clutches used on General excavators. There are detailed views of this unit and diagrams of how the twin disc clutches affect operation.

20 FINE GRINDING AND AIR SEPARATING EQUIPMENT.—Williams Patent Crusher & Pulverizer Co. Bulletin 580 describes and illustrates the features and operation of the Williams air separator, roller and impact mills, and unit coal pulverizers.

21 FINE REDUCTION CRUSHER.—Traylor Engineering & Mfg. Co. Bulletin 113 presents the new Traylor-Stearns multi-stage fine reduction crusher in which the upper stage, when provided with a proper feed, functions as a highly efficient feeder for the lower stage.

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**22** LEATHER BELT DRIVES. — American Leather Belting Association has prepared a data book on short-center motor drives with the help of 46 manufacturers of leather belting and motor bases. Included is data and information on leather belting advantages, efficiency, life, comparative first costs, standard pulley diameters and motor belt speeds, basic horse power tables, drive selection tables and list prices of endless leather belts.

**23** LOCOMOTIVES. — Davenport Locomotive Works. An illustrated booklet presents the features and specifications of the latest type Davenport gasoline and diesel locomotives.

**24** LUBRICANTS.—Fiske Brothers Refining Co. Lubriplate Film for September, 1939, deals with the use of Lubriplate lubricants in the rock products industry and makes specific recommendations for various types of machinery.

**25** MOTORS AND GENERATORS.—General Electric Co. Bulletin GEA-1326D describes the features of the G-E totally enclosed, fan-cooled induction motors, and bulletin GEA-1960A, the features of the G-E low-speed, synchronous generators.

**26** OIL RECLAIMER.—Hillard Corp. Bulletin No. 81 describes and illustrates the features, operation, and a number of typical applications of the Hilco Oil reclaimer for purifying Diesel engine oil.

**27** PRIMARY CRUSHER.—Pioneer Engineering Works, Inc., has developed a primary crusher with wavy-shaped jaws to reduce amount of slabby product and increase working life of jaws. Details appear in New Machinery and Equipment Section.

**28** PUMPS.—Worthington Pump and Machinery Corp. Bulletin W-321-B14 details the features and operation of Monobloc pumps, a complete line of balanced pumps built integral with motor with heads up to 280 ft. and capacities to 1000 g.p.m.

**29** PYROMETERS. — Leeds & Northrop. Catalog N-33D is about the L & N Optical pyrometer, which, electrically, is a potentiometer employing the balance method for measurements of industrial temperatures. A series of close-up views show how the instrument is operated, and a discussion of the fundamentals of optical pyrometry is included.

**30** SCREENING EQUIPMENT.—W. S. Tyler Co. Bulletin 919 illustrates and explains briefly Tyler wire cloth and screening machinery. It also contains a guide to other Tyler bulletins available.

**31** SHAFT HOISTS.—Sullivan Machinery Co. Bulletin 76-C describes and illustrates Sullivan portable shaft, slope and supply hoists.

**32** SHOVEL AND DRAGLINE—Lima Locomotive Works, Inc. Type 1201 is a fast operating, powerful combination shovel and dragline said to be particularly adaptable for quarry and strip mine work. Details are given in the New Machinery and Equipment Section.

**33** STORAGE CONTROL. — Stephens-Adamson Mfg. Co. Bulletin 1239 is about the operation of the Tellevel for automatic control of starting and stopping conveyors feeding bulk materials to bins or hoppers and for opening and closing valves feeding liquids into tanks. Diagrams show clearly how the Tellevel operates.

**34** SKIP-HOIST CONTROLLERS. — Westinghouse Electric & Mfg. Co. has issued a booklet on its line of heavy-duty skip-hoist controllers for squirrel cage motors. It covers the entire range of skip-hoist duty.

**35** SIEVE TESTING EQUIPMENT.—W. S. Tyler Co. Bulletin 918 presents Tyler equipment for testing grinding and screening operations.

**36** STOP NUTS.—Elastic Stop Nut Corp. has issued a 56-page catalog which also explains graphically the Elastic Stop principle, whereby the nut is locked to the bolt through the action of a resilient non-metallic collar which eliminates all thread play between nut and bolt.

**37** TRUCKS.—Ford Motor Co. The 1940 line of trucks which include 42 body and chassis types, six wheelbases, three V-8 engines, and hydraulic brakes, feature accessibility of engine and other equipment. Details are given in the New Machinery and Equipment Section.

**38** TRUCK MIXERS.—T. L. Smith has added 3, 4 and 5-cu. yd. sizes to their line of Smith-Mobile truck mixers and agitators. They are described and illustrated in the New Machinery and Equipment Section.

**39** V-BELT FASTENERS.—Flexible Steel Lacing Co. has brought out an easily applied fastener for v-belts. Complete details and an illustration appear in the New Machinery and Equipment Section.

**40** WATER COOLED FURNACES. — Babcock & Wilcox Co. has issued a 32-page bulletin which discusses the functions of water cooling for boiler furnaces and shows by appropriate illustrations interesting details of B&W water-cooled furnace constructions and varied typical applications.

**41** WELDERS.—Lincoln Electric Co. "101 Welding Ideas for Low-Cost Maintenance" shows by case studies of 101 maintenance jobs, how general repair work and fabrication of replacements, jigs, fixtures, etc., is done by the electric arc process. Many of the examples are taken directly from the rock products industry or are applicable to it.

**42** WELDING ELECTRODES AND PLATES.— Stulz-Sickles Co. has issued two folders, one describes the application and characteristics of Seaco hard surfacing electrodes and the other is about Manganal 11 to 13½ percent manganese nickel steel hot rolled plates.

**43** WIRE ROPE SLING.—Macwhyte Co. has developed an improved loop-eye sling called the Y-Guard which is said to offer greater safety to workmen's hands. The sling is illustrated in the New Machinery and Equipment Section.

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*For alphabetical index see page 104*

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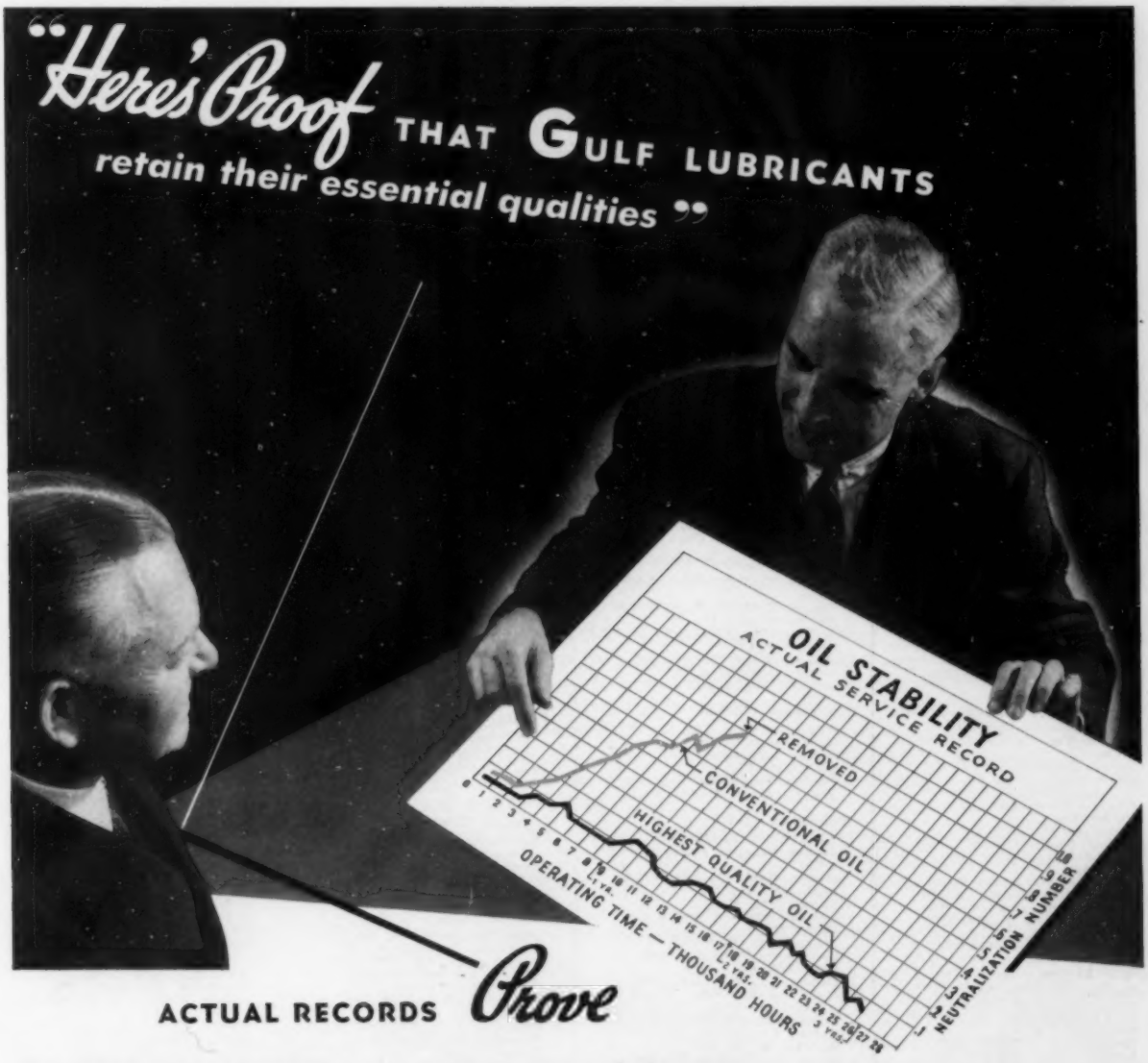


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Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.

**Crushers (Laboratory)**

Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Crushers (Primary Breakers)**

Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Crushers Reduction**

Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

**Crushers (Ring)**

American Pulverizer Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Crushers (Roll)**

Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Crushing Rolls**

Austin-Western Road Machy. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Crushing & Screening Plants (Portable)**

Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Dixie Machy. Mfg. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

**Curing Racks**

Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

**Dedusters**

Blaw-Knox Co.
Western Precipitation Co.

**Dehydrators**

Pioneer Engineering Works, Inc.

**Derricks**

Hayward Co.

**Detonators**

Atlas Powder Co.
Ensign-Bickford Co.

**Dewatering Equipment**

Allis-Chalmers Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.


# Christmas Greetings

## With Best Wishes For The New Year

**Christmas 1939** is just ahead—with all its kindly sentiment, its good cheer and family reunions. It will bring too, its perplexities—among them the old, old problem of *what to give?*

Why not give something this year that will be useful as well as sentimental—inexpensive, yet practical. Something that carries your good wishes to your friends *every month in the year*?

**Send ROCK PRODUCTS Subscriptions.** *Our Special Christmas Group Plan* enables you to send subscriptions—one year each, to two of your friends and to include your own one year subscription, for only $3.00. If you are already a subscriber, we will add a year to your present expiration date.

Just before Christmas, we will mail your two friends a beautiful Christmas Announcement wishing them, in your name, a Merry Christmas and a Happy New Year.

There can be no more appreciated gift for a man in your business than a subscription to ROCK PRODUCTS—the friendly publication that speaks *your* language and deals with *your* problems understandingly.

Only a limited number of these groups can be accepted, so please act promptly.

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205 W. Wacker Drive
Chicago, Illinois

*USE CONVENIENT FORM BELOW TO SEND YOUR ORDER*

Send ROCK PRODUCTS one year each to the two names below. Mail cards announcing gift in my name just before Christmas.

Name .....
Position .....
Company .....
Address .....
City and State .....

Name .....
Position .....
Company .....
Address .....
City and State .....

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**And** *enter or extend my own subscription to* ROCK PRODUCTS *for ONE full year.*

It is understood that you will accept all THREE subscriptions at the special Christmas rate of $3.00.

*SEND YOUR BILL TO*

Sender's Name .....
Position .....
Company .....
Address .....
City and State .....

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# Classified Directory (Cont.)

**Diaphragms (Rubber)**
Jaeger Machine Co.

**Dippers & Teeth (Dredge & Shovel)**
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Koehring Co.
Link-Belt Co.
Marion Steam Shovel Co.
Thew Shovel Co.

**Disintegrators**
Smidth, F. L., & Co.

**Ditchers**
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

**Dragline & Cableway Excavators**
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Pioneer Engr. Works, Inc.
Sauerman Bros., Inc.
Thew Shovel Co.

**Dredge Cutter Heads & Ladders**
Bucyrus-Erie Co.
Eagle Iron Works
Hetherington & Berner, Inc.

**Dredge Hulls**
Chicago Bridge & Iron Co.
Eagle Iron Works

**Dredges**
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc.
Link-Belt Co.
Marion Steam Shovel Co.

**Dredge Sleeves**
Hetherington & Berner, Inc.

**Drilling Accessories**
Bucyrus-Erie Co.
Gardner-Denver Co.

**Drill Bits**
Bucyrus-Erie Co.

**Drill Sharpening Machines**
Bucyrus-Erie Co.
Gardner-Denver Co.

**Drill Steel**
Bethlehem Steel Co.
Gardner-Denver Co.

**Drills (Blast Hole)**
Bucyrus-Erie Co.
Gardner-Denver Co.

**Drills (Hand Hammer)**
Gardner-Denver Co.

**Drills (Rock)**
Bucyrus-Erie Co.
Gardner-Denver Co.
Jeffrey Mfg. Co.

**Drills (Wagon)**
Gardner-Denver Co.

**Drills (Well)**
Bucyrus-Erie Co.

**Drives (Belt Chain & Rope)**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

**Drives (Short-Center)**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Link-Belt Co.
Smidth, F. L., & Co.

**Drives (Worm)**
Link-Belt Co.

**Dryers**
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engr. Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

**Dust Arrestors**
Blaw-Knox Co.
Research Corp.
Western Precipitation Co.

**Dust Collecting Systems**
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Raymond Pulverizing Div.
Research Corp.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Western Precipitation Co.

**Dust Collecting Bags**
Blaw-Knox Co.
Sly, W. W., Mfg. Co.

**Dust Conveying Systems**
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Raymond Pulverizer Div.
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

**Dust Precipitators**
Research Corp.
Western Precipitation Co.

**Dust Recovery Plants**
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

**Dynamite**
Atlas Powder Co.

**Electric Cables**
General Electric Co.

**Electric Motors**
Allis-Chalmers Mfg. Co.
General Electric Co.
Hayward Co.

**Electric Motor Starters**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Elevators**
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chicago Steel Fdry. Co.
Eagle Iron Works
Fuller Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Engineers (Designing & Consulting)**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Engines (Diesel, Gas, Kerosene & Oil)**
Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.
Cummins Engine Co. (Diesel)
National Supply Co. (Diesel)
Nordberg Mfg. Co.
Superior Diesel (Diesel)

**Engines (Natural Gas)**
Allis-Chalmers Mfg. Co.

**Engines (Steam)**
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

**Exhausters**
Combustion Engr. Co.
Raymond Pulverizer Div.

**Explosives**
Atlas Powder Co.

**Fans**
Blaw-Knox Co.
General Electric Co.
Jeffrey Mfg. Co.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.

**Feeders**
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Kent Machine Co.
Blaw-Knox Co.
Fuller Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.

**Filter Cloth**
Roeblings, John A., Sons Co.
Tyler, W. S., Co.

**Finished Cement Grinding Aid**
Dewey & Almy Chemical Co.

**Forges**
Gardner-Denver Co.

**Forgings**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.

**Frogs & Switches**
Frog, Switch & Mfg. Co.

**Fly Ash Collectors**
Research Corp.
Western Precipitation Co.

**Fuels (Diesel)**
Texas Co.

**Fume Collectors**
Research Corp.
Western Precipitation Co.

**Furnaces (Heat Treating, Electric)**
General Electric Co.

**Fuse Cutouts**
General Electric Co.

**Fuse Cutters**
Ensign-Bickford Co.

**Fuse Lighters**
Ensign-Bickford Co.

**Fuses (Detonating & Safety)**
Atlas Powder Co.
Ensign-Bickford Co.

**Fuses (Electric)**
General Electric Co.

**Galvanometers**
Atlas Powder Co.
General Electric Co.

**Gas Scrubbers**
Research Corp.
Western Precipitation Co.

**Gasoline**
Gulf Refining Co.
Texas Co.

**Gas Producers**
Blaw-Knox Co.

**Gear-Motors**
Allis-Chalmers Mfg. Co.
General Electric Co.
Link-Belt Co.

**Gears**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

**Generator & Motor Generator Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.
National Supply Co. (Diesel)
Nordberg Mfg. Co.
Superior Diesel (Diesel)

**Glass Sand Equipment**
Lewistown Fdry. & Mach. Co.

**Gloves**
Sly, W. W., Mfg. Co.

**Grapples**
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Owen Bucket Co.

**Grating**
Blaw-Knox Co.
Eagle Iron Works

**Grease**
Bacon, Earle C., Inc.
Gulf Refining Co.
Texas Co.

**Grease Cups**
Link-Belt Co.
Robins Conveying Belt Co.

**Guards (Machinery)**
Harrington & King Perf. Co.
Tyler, W. S., Co.

**Guns**
Hetherington & Berner, Inc.

**Gypsum Plants**
Traylor Engr. & Mfg. Co.

**Hangers, Anchors & Inserts (Concrete)**
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

**Haulage Systems (Electric)**
General Electric Co.
Jeffrey Mfg. Co.

**Haulage Systems (Remote Control)**
Dempster Bros.
General Electric Co.
Koehring Co.

**Helmets**
Sly, W. W., Mfg. Co.

**Hoists (Chain, Electric, Skip, Portable, Air, etc.)**
Allis-Chalmers Mfg. Co.
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Commercial Shearing & Stamping Co.
Eagle Iron Works
Gardner-Denver Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Northwest Engineering Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.

**Hoppers**
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Merrick Scale Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

**Hose (Air, Drill, Water, Steam, Sand Suction & Discharge)**
Dixie Machinery Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Sly, W. W., Mfg. Co.

**Hose (Sand Blast)**
Sly, W. W., Mfg. Co.

**Hydrators**
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

**Jigs (Sand & Gravel)**
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

**Joists & Slab Machines (Concrete)**
Besser Mfg. Co.

**Kiln Burners**
Babcock & Wilcox Co.
Smidth, F. L., & Co.

**Kiln Chain Systems**
Smidth, F. L., & Co.

**Kiln Liners**
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

# Classified Directory (Cont.)

**Kiln Parts**
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Steel Foundry Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Kilns (Rotary)**
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

**Kilns (Shaft)**
Hardinge Co., Inc .

**Kilns (Vertical)**
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.

**Kominuters**
Smidth, F. L., & Co.

**Laboratory Apparatus**
Smidth, F. L., & Co.

**Lift Trucks**
Besser Mfg. Co.
Stearns Mfg. Co.

**Lime Handling Equipment**
Chicago Bridge & Iron Co.
Combustion Engr. Corp.
Fuller Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

**Lime Plants**
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Blaw Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Lime Putty Plants**
Chicago Bridge & Iron Co.

**Loaders (Boat)**
Fuller Co.
Link-Belt Co.

**Loaders (Box Car)**
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.

**Loaders (Car, Truck, Bin & Hopper)**
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Fuller Co.
Gardner-Denver Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Stearns Mfg. Co.

**Loaders (Underground)**
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Nordberg Mfg. Co.
Thew Shovel Co.

**Locomotive Stack Netting**
Tyler W. S., Co.

**Locomotives (Diesel-Electric)**
Davenport-Besler Corp.
Lima Locomotive Works (Loco. Div.)

**Locomotives (Electric, Trolley & Storage Battery)**
Davenport-Besler Corp.
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Loco. Div.)

**Locomotives (Gasoline & Gas-Electric)**
Davenport-Besler Corp.
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Wks., Inc. (Loco. Div.)

**Locomotives (Kerosene)**
Lima Locomotive Works, Inc. (Loco. Div.)

**Locomotives (Oil & Oil-Electric)**
General Electric Co.

**Locomotives (Steam)**
Davenport-Besler Corp.
Lima Locomotive Works, Inc. (Loco. Div.)

**Lubricants**
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.

**Machine Shop Equipment**
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Magnetic Separators**
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

**Magnets**
General Electric Co.

**Manganese Steel Parts**
Bacon, Earle C., Inc.
Dixie Machy. Mfg. Co.
Frog, Switch & Mfg. Co.

**Manhole Block Machines (Concrete)**
Stearns Mfg. Co.

**Material Handling Equipment**
Austin-Western Rd. Machy. Co.
Barber-Greene Co.
Fuller Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.

**Measuring Devices**
Blaw-Knox Co.
Fuller Co.
Hardinge Co., Inc.
Jaeger Machine Co.
Schaffer Poidometer Co.

**Mill Liners**
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Dixie Machy. Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Mill Parts**
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Mills, Grinding (Ball, Compartment, Emery, Hammer, Pug, Rod, Roll, Tube, etc.) (See Pulverizers also)**
Allis-Chalmers Mfg. Co.
American Puverizing Co.
Babcock & Wilcox Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jackson & Church Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machy. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Mortar Mixers**
Eagle Iron Works
Jaeger Machine Co.

**Nails**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

**Nozzles (Sand Blast)**
Sly, W. W., Mfg. Co.

**Nozzles (Washing)**
Link-Belt Co.

**Nuts**
Bethlehem Steel Co.

**Oil Burners**
Smidth, F. L., & Co.

**Oils (Cutting)**
Texas Co., The

**Oils (Lubricating)**
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co., The

**Outdoor Lighting Equipment**
General Electric Co.

**Packers**
Modern Valve Bag Co.
Smidth, F. L., & Co.

# Classified Directory (Cont.)

**Pallets (Steel & Wood)**
Anchor Concrete Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

**Pans, Grinding (Wet & Dry)**
Eagle Iron Wks.
Jackson & Church Co.
McLanahan & Stone Corp.
Traylor Engr. & Mfg. Co.

**Perforated Metal**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perf. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Son, Inc.
Traylor Engr. & Mfg. Co.

**Pinions**
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co., The
General Electric Co.
Jeffrey Mfg. Co., The
Link-Belt Co.

**Pipe**
Bethlehem Steel Co.
Chicago Bridge & Iron Co.
Frog, Switch & Mfg. Co., The
Hetherington & Berner, Inc.

**Pipe Fittings**
Hetherington & Berner, Inc.

**Pipe, Forms & Machine (Concrete)**
Besser Mfg. Co.
Stearns Mfg. Co.
Universal Concrete Pipe Co.

**Plaster Mixers**
Eagle Iron Works
Jaeger Machine Co.

**Plaster Plants**
Koehring Co.

**Poidometers**
Schaffer Poidometer Co.

**Pontoons**
Chicago Bridge & Iron Co.
Eagle Iron Wks.

**Powder (Blasting)**
Atlas Powder Co.

**Power Transmission Machinery**
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co., The
Link-Belt Company
Robins Conveying Belt Co.
Smidth, F. L., & Co.

**Power Units**
Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.
Cummins Engine Co. (Diesel)
Nordberg Mfg. Co.

**Precipitators (Cottrell)**
Research Corp.
Western Precipitation Co.

**Pulleys**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.

**Pulverizer Parts**
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

**Pulverizers (Hammer, Ring, Rod & Roll) (See also Mills & Crushers)**
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Combustion Engr. Corp.
Dixie Machy. Corp.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div. Sturtevant Mill Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

**Pumps (Diaphragm)**
Hardinge Co., Inc.
Jaeger Machine Co.

**Pump Valves (Dry Pulverized Material)**
Fuller Co.

**Pumps (Dredge)**
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Hetherington & Berner

**Pumps (Dry Pulverized Material)**
Babcock & Wilcox Co.
Fuller Co., The
Smidth, F. L., & Co.

**Pumps (Slurry)**
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

**Pump, Slurry, Valves**
Fuller Co., The
Wilfley, A. R., & Sons, Inc.

**Pumps (Vacuum)**
Allis-Chalmers Mfg. Co.
Fuller Co., The
Gardner-Denver Co.
Smidth, F. L., & Co.

**Pumps (Water)**
Allis-Chalmers Mfg. Co.
Gardner-Denver Co.
Jaeger Machine Co.

**Rails**
Bethlehem Steel Co.

**Railway Equipment**
General Electric Co.

**Railways (Electric)**
General Electric Co

**Rectifiers**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Recuperators**
Traylor Engr. & Mfg. Co.

**Refractories**
Babcock & Wilcox Co.
Smidth, F. L., & Co.

**Regulators (Voltage)**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Rewashers (Screw)**
Eagle Iron Works
Link-Belt Co.
Smith Engr. Wks.

**Rheostats**
Atlas Powder Co.
General Electric Co.

**Roofing**
Bethlehem Steel Co.
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

**Rope (Transmission)**
Allis-Chalmers Mfg. Co.

**Sand Drags**
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Smith Engr. Wks.

**Sand and Gravel Plants**
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co., The
Bacon, Earle C., Inc.
Eagle Iron Wks.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

**Sand Lime Brick Machinery**
Hardinge Co., Inc.
Jackson & Church Co.
Jeffrey Mfg. Co.

**Sand Separators**
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Simplicity Engineering Co.
Smith Engineering Wks.

**Sand Settling Tanks**
Chicago Bridge & Iron Co.
Eagle Iron Wks.
Jeffrey Mfg. Co.

# Classified Directory (Cont.)

Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Smith Engr. Wks.

**Scales (Conveyor)**
Merrick Scale Mfg. Co.

**Scales (Hopper)**
Blaw-Knox Co.
Merrick Scale Mfg. Co.

**Scales (Truck & Track)**
Hardinge Co., Inc.

**Scrapers (Power Drag)**
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co., The
Jeffrey Mfg. Co.
Link-Belt Co.
Northwest Engineering Co.
Pioneer Engr. Wks.
Sauerman Bros.

**Scrapers (Wagon)**
Bucyrus-Erie Co.

**Screen Cloth & Plates (Perforated)**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perforating Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.

**Screen Parts**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Hardinge Co., Inc.
Pioneer Engr. Wks.
Screen Equipment Co.
Traylor Engr. & Mfg. Co.

**Screens**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

**Screens (Grizzly)**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Engr. Wks. Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

**Screens (Laboratory)**
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons, Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

**Screens (Revolving)**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Eagle Iron Wks.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt
Roebling's, John A., Sons Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.

**Screens (Rotary)**
Link-Belt Co.
Smith Engr. Wks.

**Screens (Scalping)**
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Wks.
Williams Patent Crusher & Pulv. Co.

**Screens (Trommel)**
Link-Belt Co.
Traylor Engr. & Mfg. Co.

**Screens (Vibrating)**
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Eagle Iron Wks.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Roebling's John A., Sons Co.
Screen Equipment Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

**Screens (Washing)**
Link-Belt Co.
McLanahan & Stone Corp.
Screen Equipment Co.

**Scrubbers (Washers)**
Link-Belt Co.
McLanahan & Stone Corp.
Smith Engr. Wks.
Tyler, W. S., Co.

**Seal Rings**
Traylor Engr. & Mfg. Co.

**Shafting**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

**Shale Planers**
Eagle Iron Works

**Sheaves**
Allis-Chalmers Mfg. Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Wks.
Hetherington & Berner
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Roebling's, John A., Sons Co.
Sauerman Bros.

**Shovels (Compressed Air)**
Nordberg Mfg. Co.

**Shovels, Power (Diesel, Diesel-Air Electric, Gasoline, Gas-Electric, Oil, Steam)**
Austin-Western Rd. Machinery Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.

**Shovels (Tractor)**
Austin-Western Rd. Machy. Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

# Classified Directory (Cont.)

**Shovels (Truck)**
Link-Belt Speeder Corp.
Thew Shovel Co.

**Shovels (Underground)**
Allis-Chalmers Mfg. Co.
Lima Loco. Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.
Thew Shovel Co.

**Shredders**
Williams Patent Crusher & Pulv. Co.

**Sieves (Testing)**
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S.

**Silos (Storage)**
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Smidth, F. L., & Co.

**Silo Stave Machines (Concrete)**
Besser Mfg. Co.

**Skids**
Besser Mfg. Co.
Chase Foundry & Mfg. Co.

**Slakers (Rotary)**
Traylor Engr. & Mfg. Co.

**Slags (Grinding)**
Smidth, F. L., & Co.

**Slurry Mixers**
Hardinge Co., Inc.
Smidth, F. L., & Co.

**Slurry Separators**
Smidth, F. L., & Co.

**Slurry Thickeners**
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Smokestacks**
Chicago Bridge & Iron Co.
Traylor Engr. & Mfg. Co.

**Speed Reducers (Gear, etc.)**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

**Spouts**
Jeffrey Mfg. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

**Sprays & Spraying Equipment**
Link-Belt Co.

**Sprockets**
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.

**Stabilization Equipment**
Barber-Greene Co.
Besser Mfg. Co.
Pioneer Engr. Wks.

**Standpipes**
Chicago Bridge & Iron Co.
Ross Screen & Feeder Co.

**Steel (Abrasive-Resisting)**
Ryerson, Jos. T., & Son, Inc.

**Steel (Special Alloy)**
Chicago Steel Foundry Co.

**Stokers**
Babcock & Wilcox Co.
Combustion Engr. Co., Inc.
Link-Belt Co.

**Storage Equipment**
Barber-Greene Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Jeffrey Mfg. Co.
Kern, Fred T., Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

**Strippers (Concrete)**
Anchor Concrete Machinery Co.
Multiplex Concrete Machinery Co.

**Switchboards**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Tachometers**
General Electric Co.

**Tampers (Power & Hand)**
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

**Tanks (Air, Storage, etc.)**
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engr. Co.
Eagle Iron Wks.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Raymond Pulv. Div.
Traylor Engr. & Mfg. Co.

**Towers**
Blaw-Knox Co.
Eagle Iron Works
Jaeger Machine Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

**Track and Track Equipment**
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Nordberg Mfg. Co.

**Track Shifters**
Nordberg Mfg. Co.

**Track Systems (Overhead)**
Jeffrey Mfg. Co.
Link-Belt Co.

**Tractors**
Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.
Koehring Co.

**Tractors (Electric)**
Link-Belt Co.

**Trailers (Industrial, Quarry)**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co.
Koehring Co.
Link-Belt Speeder Corp.

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Trench Hoes**
Link-Belt Speeder Corp.

**Trucks (Agitator)**
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co.

**Truck Bodies (Dump)**
Commercial Shearing & Stamping Co.
Dempster Bros.

**Trucks (Dump)**
Chase Foundry & Mfg. Co.

**Trucks (Hand)**
Chase Foundry & Mfg. Co.

**Trucks (Industrial)**
Chase Foundry & Mfg. Co.

**Trucks (Mixer)**
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co.

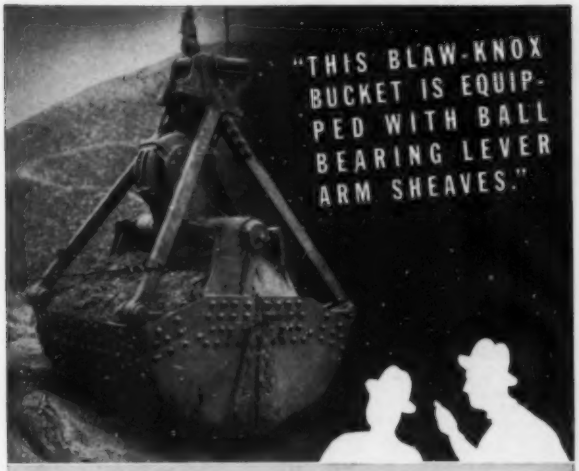
**Turbines**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Unloaders (Car, Bin, Truck, etc.)**
Barber-Greene Co.
Bucyrus-Erie Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.

**Unloaders (Boat)**
Link-Belt Co.

**Unloaders (Box Car)**
Barber-Greene Co.
Besser Mfg. Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

**Unloaders (Pneumatic)**
Fuller Co.

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17

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BLAW-KNOX DIVISION
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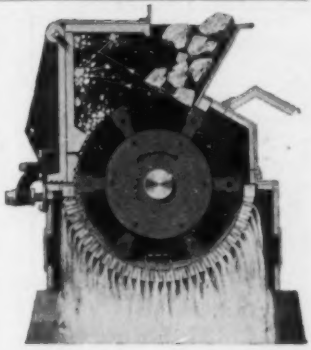

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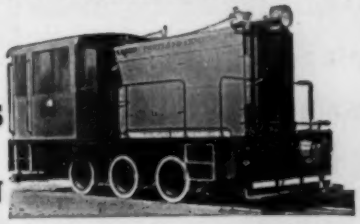

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**DAVENPORT LOCOMOTIVE WORKS**

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**Unloaders (Underground)**
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

**Ventilating Apparatus**
Blaw-Knox Co.

**Vibrators (Bin and Concrete Form)**
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.
Tyler, W. S., Co.

**Vibrating Screens**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co., The
Bacon, Earle C., Inc.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Co.
Nordberg Mfg. Co.
Robins Conveying Belt Co.
Pioneer Engineering Wks.
Screen Equipment Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

**Wagons (Dump)**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Koehring Co.

**Washers (Log)**
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

**Washers (Sand, Gravel & Stone)**
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewiston Fdry. & Machy. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

**Weighing Equipment**
Blaw-Knox Co.
Fuller Co.
Hardinge Co., Inc.
Jaeger Machine Co.
Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

**Welding and Cutting Equipment**
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Columbia Steel Co. (U. S. Steel Corp. Subsi.)
General Electric Co.
Roebling's, John A., Sons Co.

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American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

**Welding Rods**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.

**Welding Wire**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.

**Winches**
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

**Wire Cloth**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Eng. Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

**Wire (Copper, Iron & Steel)**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
General Electric Co.
Roebling's, John A., Sons Co.

**Wire (Electric)**
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Columbia Steel Co. (U. S. Steel Corp. Subsi.)
General Electric Co.
Roebling's, John A., Sons Co.

**Wire Rope**
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American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Leschen A., & Sons, Rope Co.
Roebling's, John A., Sons Co.

**Wire Rope Clips**
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Leschen A., & Sons
Roebling's, John A., Sons Co.

**Wire Rope Coatings**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

**Wire Rope Fittings**
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Leschen A. & Sons, Rope Co.
Roebling's, John A., Sons Co.

**Wire Rope Hooks**
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Leschen A., & Sons, Rope Co.
Roebling's, John A., Sons Co.

**Wire Rope Lubricants**
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.
Texas Co., The

**Wire Rope Slings**
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Leschen, A., & Sons, Rope Co.
Roebling's, John A., Sons

**Wire Rope Sockets**
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American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Leschen, A., & Sons Rope Co.
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1—24x36" Farrell, B15—new jaws. Used one month after complete rebuilding.
2—8x36" Universal, reduction type. Can be set to ¾".
1—42x48" Traylor Bull-dog.
1—18x30" Allis-Chalmers.

**GYRATORY FINE REDUCTION CRUSHERS:**

2—2' Symons Cones, fine bowls.
2—No. 2F Telsmith, 32" dia. heads—to ⅜".
1—No. 37 Kennedy Gearless, with spare shaft.
1—4' Traylor, Type No. 410-TZ.
1—3' Traylor, Type TZ.
1—No. 25 Kennedy, vertical, motor driven.
1—8" Traylor with bell head and non-choking concaves.
1—10" Newhouse, with 100 H.P. motor.

**CRUSHING ROLLS:**

7—Sets of 24" dia. x 14" Allis-Chalmers.
1—Set of 20" x 14", Sturtevant, balanced type.
1—Set of 36" x 16" Sturtevant.
1—Set of 26" x 14" Allis-Chalmers.

**BELT CONVEYORS:**

3—16" 35', 85', 160' c/c.
1—18" 100' c/c.
3—24" 80', 160', 210' c/c.
All of these conveyors are equipped with Rex-Stearns anti-friction ball bearing troughing and return idlers. The 80' conveyor has a magnetic head pulley.

**VIBRATING SCREENS:**

18—Tyler Hummers; 12—3' x 5', 4—4' x 5', all double deck; 3 x 5' triple deck; 4 x 5' triple deck. All of the steel enclosed type, with V-16 vibrators.
1—Tyler Rotap Testing Screen, motor driven.
5—Motor Generator Sets for operating Tyler Screens; 1 KW, 1½ KW, 2 KW, 6 KW.
2—3'x 5' Leahy, single and double deck.
5—4' x 7' Leahy, double deck, motor driven.
4—3' x 6' Sturtevant M-V, double deck.
1—4' x 8' Symons, 3-deck.
3—5' x 10' Symons, 3-deck, motor driven.
2—4' x 7' Traylor, 2-deck.

**RAYMOND PULVERIZERS:**

3—No. 60 "Imp" type, each with air separator and direct connected 60 H.P., 3/60/440 volt, 1750 RPM. motor, also feeder motor.
2—3-roll and 5-roll, High Side type, for fine separation.
3—4-roll and 5-roll, Low Side type.
8—Beater types; No. 0000, 00, 0, 1 and 3.
2—No. 0000, with direct connected 10 H.P. motors.

**HARDINGE CONICAL BALL MILLS:**

1—3' x 8" iron lined, worm gears, silent chain drive.
2—4'½ x 16", iron and silex lined.
1—5' x 22", iron lined.
2—6' x 22", iron and silex lined.
1—7' x 22" Hardinge Conical Ball Mill, titanite lined, 28" trunnions.
6—8' x 72", 12" herringbone gears, 20" trunnions, steel shells, steel heads, scoop feeders, railroad rail liners.
3—8' x 18", 8" herr. gears, railroad rail liners.
5—8' x 30", steel shells, 10" herr. gears, arranged for direct motor drive through flexible coupling; iron lined.
2—8' x 30", same as above, but silex lined.
1—6' x 30", silex lined, 8" herr. gears, 13" trunnions.

**INDIRECT HEAT ROTARY DRYERS:**

3—4' x 35', 70" x 40', 80" x 65', all Type BV, made by L. R. Christie Co., Pittsburgh.

*Refer to full page ad November issue for listings of several plants we are now liquidating, or write for detailed circular.*

**CONSOLIDATED PRODUCTS CO., INC.**

15-16-17 PARK ROW — NEW YORK, N. Y.

## For Prompt Shipment Subject to Prior Sale

10 x 36 Gruendler Roller Bearing Crusher Plant with RA2P LeRoi Engine.

28' Elevator.

36 x 12' Screen.

30 Ton, 4 compartment Bin.

26' Reject Conveyor.
(Slightly used, as good as new)

NEW 15 x 26 Gruendler Roller Bearing Jaw Crusher.

NEW 24 x 36 Plain Bearing Jaw Crusher.

1—USED 10 to 15 ton per hour Gruendler Pulverizer.

1—NEW 10 to 15 ton per hour Pulverizer.

1—NEW 6 to 7 ton per hour Gruendler Pulverizer.

**CRUSHER SERVICE**

Box 795 — St. Louis, Missouri

36"x150' Robins Belt Conveyor Equipment.
30"x250' Robins Belt Conveyor Equipment.
12"-36" Head & Tail Pulleys with Drives.
18" & 24" Equipment for 150' Conveyors. Also 14-16-20" Belt, Idlers, Etc. In Stock.
24" Plate Feeders & 18-24" Belt Trippers.
H & T Pulley Assembly for 36" Elevator.
24"x40' Cont. Bucket Elevator on 2-chain.
2—14"x30' Bucket Elevators, Enclosed.
14"x50' Cont. Inclined Bucket Elevators.
5"x36' Bucket Elevator On Belt, Enclosed. Also Steel Casings, Buckets, Chain, Belt.
Jaw Crushers In Stock 9x15, 10x20, 12x18.
8" Traylor "Bulldog" Gyratory Crusher.
28"x20" Robins Corrugated Crushing Rolls.
15" x 8" Jeffrey Swing Hammer Pulverizer.
No. 30 Telsmith Rotary Grizzly, ⅞" Rings.
8'x22" Hardinge Pebble Mill, Silex Lined.
3x5' 1-deck Multirap Vib. Screen, V-belt.
3x6' 2-deck Leahy Vib. Screen, 1½ motor.
3x6' 1-deck Plat-O Vib. Screen, 3-hp.
2—3x8' 1-deck 1-unit Linkbelt Screens.
4x5' Hummer No. 37 Vib. Screen, V-16 head.
4x5' Hummer 37 Vib. Screen, 2-deck V-40. Also Hummer Screen Sections, 3x5 & 4x5'.
⅝-yard Blaw-Knox Clamshell Dig. Bucket.
⅝-yard Hayward Clamshell Mat'l. Bucket.
½, 1 and 1½-yard Dragline Buckets.
1-drum I-R Tugger Air Hoist, 1000 lb. cap.
1-drum Ldg. Revers. 7½-hp. Elec. Hoist.
Hains Loader On Wheels. Cletrac Tractor.
50-hp. Slipring Motor, Revers. Control.
10 Elec. Centrif. Water Pumps, 100-g. up.
6" Goulds Centrif. Pump, 50-hp. Waukesha.
92' I-R ER-1 Air Compressor, 7x6" belted.
176' Chicago Air Compressor, 9x8" belted.
36"-g. Easton 2-yd. V Side Dump Cars. Also 24"-g. Side & End Dump Cars & Track.

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**WE OFFER THE FOLLOWING STANDARD GAUGE SADDLE TANK**

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**at Very Attractive Prices**

**ALL THOROUGHLY RECONDITIONED**

3—14x22 American 40 Ton
1—15x22 Porter 40 Ton
1—14x20 Porter 38 Ton
1—14x20 Vulcan 38 Ton
1—13x18 Porter 32 Ton
1—12x18 American 25 Ton

*Complete Stock List on Request*

**BIRMINGHAM RAIL & LOCOMOTIVE CO.**
BIRMINGHAM, ALA.

# "E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

## AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

## BINS

11—1—150 ton 3 cpt. Blaw Knox; 1—118 ton Blaw Knox; 2—85 ton Heltzel; 1—60 yd. Butler V-60; 1—72 ton Blaw Knox; 1—46 yd. Johnson offset; 1—60 ton Butler V-40; 2—35 ton Blaw Knox; 1—26 ton Heltzel with Kron dial scale. All above with or without weigh batchers.

2—Cement plants: 1—1200 bbl. Blaw Knox; 1—300 bbl. Johnson, portable.

## BUCKETS

26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.

6—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page; 1—1½ yd. Pioneer Cableway Excavator bucket.

7—Dragscraper: 2—1 yd Sauerman; 1—1 yd. Green; 1—⅝ yd. Garst; 2—½ yd. Garst.

## CONVEYORS & ELEVATORS

4—18" Steel frame belt conveyors: 3—Barber-Greene, 60', 45' and 24'; 1—National 20'.

11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

## CRANES, DRAGLINES & SHOVELS

1—Link Belt Mod. K-55 combination dragline and shovel Ser. No. 1698, gasoline power, 70' dragline boom, 2 yd. shovel front.

1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.

1—Industrial Brownhoist Mod. DC, Serial No. 5020, 50 ft. boom, 1¼ yard bucket.

1—Link-Belt K-42, combination shovel, crane and trench hoe, Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.

2—Northwest, Model 105, Serial No. 2853 & No. 1522 40' boom, 1 yd. bucket.

1—Link-Belt, K-1, Serial No. 1034, 50' boom, 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 2069 & No. 2087, combination 1 yd. shovel and crane, 40' boom.

2—Thew, Model "0" combination shovel crane and dragline, Serial No. 2801 & No. 2687, ¾ yd. shovel fronts, 40' crane boom.

1—P & H Model No. 206, 40' boom, ¾ yd. bucket.

1—Byers Bearcat, Serial No. 3299, 39' boom, ½ yd. bucket.

SEND FOR NEW ORANGE PEEL STOCKLIST

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1—12" Morris Heavy Duty D.C. to 100 H.P. dbl. cyl. steam engine.

3—Belt driven Morris: 1—10" Mang., 1—8", 1—6" Mang.

## CRUSHERS

5—1—12"x26" Champion; 1—12"x 20" Acme; 1—10"x20" Climax No. 2½; 1—9"x16" Telsmith No. 9A; 1—9"x15" Champion.

3—Gyratory: 1 No. 5 Gates; 1 No. 3 McCully; 1 No. 0 McCully.

1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

## TRACTORS AND SCRAPERS

4—13 yd. LeTourneau Type RY scrapers with Caterpillar D8 Diesel tractors, new 1938.

## WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 3D. Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

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# CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 36" Allis-C. 20" Super. McCully conv. to 16". Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 3, 6, 8C, 9 & 16. Also Many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 2-F & 40. Traylor 36" TZ, 8", 10", 12" Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.

ROLLS: Allis-C. 12½x12½, 26x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc., Etc.

HAMMERMILLS: Williams No. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6'x5', 8'x36" & 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll. Raymonds, Kents, Fuller-Lehigh, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1620 Good Roads, 9x40 Austin-Western, 9x36 C.R.

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Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Gederators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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Including ten 10-cu. yd. standard gauge side-dump cars, double-motored; all necessary electrical control equipment; Motor-Generator Set; rails, etc.

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Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

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**Following Used Equipment at Mildred, Kansas**

2—8' x 125' Rotary Kilns.
1—6' x 50' Rotary Cooler.
1—48" x 60" Traylor Bull Dog Type Jaw Crusher.
1—48" Link-Belt Super Capacity Inclined Bucket Elevator, 62'7¾" C/L to C/L head and tail shafts.
1—30" Link-Belt Super Capacity Inclined Bucket Elevator, 95'4¾" C/L to C/L head and tail shafts.
1—Sauerman Bros. Double Drum Hoist, 15" x 12" drums.

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111 W. Monroe St.
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## Partial Equipment List

1—Steel Building 300' x 65', crane runway & 3 bridge cranes new April 1930.
1—Bin 3 compt. 149 ton Johnson, weighing scales.
15—Compressors 528'-2600' cap. Gas, Diesel, Electric drives, Stationary & Portable.
21—Boilers—20 to 150 H.P. Vertical & Horizontal —High Pressure.
60—Hoists; 1-2-3 drums.—steam, gas & electric.
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30—Flat cars—36" gauge, 4 T. roller bearing.

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***Rail and Rail Supplies***

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750 KW WEST., 250 V., 2400 A.C., 900 RPM
200 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM
200 KW G.E., 550 V., 2300/4000 A.C., 1200 RPM
150 KW WEST., 250 V.,2300/4000 A.C.,1200 RPM
100 KW G.E., 250 V., 2300 A.C., 1200 RPM

## Air Compressors

1302' I-R, PRE-2,Dir.Con.Syn.Mt.440 V., 100 lb.
1052' I-R XCB Belted Syn. Mt. 2200 V., 100 lb.
1650' I-R, PRE-2,Dir.Con.Syn.Mt. 2300 V.,100 lb.

*Each unit listed above is owned by us and is only a small part of our large stock, consisting of Synchronous Converters, Transformers, Motors, Coal Crushers, Wheel Presses and Trolley and Battery Locomotives.*

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### CONCRETE—CEMENT—EQUIPMENT

Butler batching plant, 5 compts., cap. 105 yds. aggregate, 200 bbl. cement, weighing devices, elevator, conveyors, complete.
225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
Blaw Knox 270 bbls. bulk cement plant, complete.
Pumpcrete machines, Models 180, 190 & 200.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.

### CRUSHERS—PULVERIZERS—SCREENS—FEEDERS

Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36.
Gyratory: K.V.S. 19, 25-S, 30, 37-S, 49; Telsmith 8A; Traylor 8"; McCully 12", 8", 6".
Jeffrey Type A 30" x 24" pulverizer.
Jeffrey 24" x 24" spiked roll crusher.
Robbins apron feeders, 18" x 6', 24" x 6'.
Traylor apron feeder, 5' x 15'.
Bucket elevator, 32' chain, buckets 8"x6"x12".
3' x 6' K. V. S. single deck, vibrating.
3' x 6' K. V. S. 3 decks, vibrating.
3' x 6' Telsmith, 2 deck, vibrating screen.
Revolving screens, 72"x20', 72"x18', 60"x24'.
Robbins 4x8 double deck Gyrex vib. screen.

### CRANES—SHOVELS—DRAGLINES

Whirley, 25 tons cap., 85' boom, electric.
43-B Bucyrus Erie Diesel 2 yd. shovel.
41-B Bucyrus Erie comb. crane and shovel. Steam.
P & H Model 650 crane, 60' boom.
Northwest No. 4 crane and backhoe.
Browning truck crane on White chassis.
Byers Bearcat truck crane, pneumatic tires.

### BUCKETS

Hayward clamshell, 1 yd., rehandling.
Haiss clamshell 1½ yd. rehandling.
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Sauerman Crescent drag scraper, ¾ yd.
Blaw-Knox 1 cu. yd. dragline bucket.

### CONVEYING EQUIPMENT

Barber Greene conveyor, 24" x 200', complete.
8 Barber Greene conveyors, 24" x 35', type N.

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4 I. R. Wagon drills, FM-2, pneumatic tires.
Complete stone washing plant. Write for details.
I. R. Model 50 Leyner drill sharpener.
Gas locomotives, 2½ to 25 tons.
Dredge pumps, 6", 8", 10", 12", 16".
Ing. Rand XCB-2 676 cu. ft. air compressor.
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Stiff leg derrick, steel, 30 tons, 97' boom.
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2 *1300 CFM, C.P., OCE* **Synchronous Motor Driven**

1 **360 CFM, I-R., XRB, 200 lb.**

1 ***700 CFM SULLIVAN WJ3, 125 lb.***

1 ***LORAIN NO. 57 DIESEL COMBINATION 50' Crane Boom. USED ONLY 1 YEAR.***

***A Full Line of CRUSHERS, DRYERS, SCREENS, PULVERIZERS, KILNS, BALL-MILLS, AIR CLASSIFIERS, Etc.***

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3 Kitzer & Schultless Hydrators.
**AIR COMPRESSORS**
**BELTED:** 255, 528, 676, 1000, 1300 & 1570 Ft.
**ELECTRIC:** 478, 676, 867, 1302, 1722 & 2200 Ft.
**DIESEL:** 605, 867 & 1000 Ft.
**PORTABLE GAS:** 110,160,220,310,540 & 1300 Ft.
**STEAM:** 49, 210, 528, 1300, 2200 & 3600 Ft.
**CLAMSHELL BUCKETS, SKIPS & GRAPPLES**
Owen R A & H Stone Grapples.
2 Yd. OWEN Type S Material Handling.
1½ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.
48 Steel Skips 6½ x 6 x 2½.
5 Ton Bucyrus Rock Grabs.
**CRANES AND DRAGLINES**
¾ Yd. 5 Ton O & S 30 Ft. Boom.
12 Ton NORTHWEST 50 Ft. Boom Gas.
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25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
**CATERPILLAR SHOVELS**
¾ Yd. Bucyrus 10B Electric & ¾ yd. Nisley Gas.
2 Yd. Marion Steam Shovel.
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1 Yd. NORTHWEST Gas.
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4 Yd. Bucyrus 120B Electric. Also 3 yd. Erie Elec.
**DUMP CARS**
46—KOPPEL 1½ Yd. 24 & 30 In. Ga.,V Shaped.
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20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd.Cap.
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**FLAT CARS**
9—50 ton std. ga. heavy duty flat cars.
**HOISTING ENGINES**
Gas: 15, 30, 60, 100 & 120 HP.
Electric: 30, 52, 80, 100 & 150 HP.
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**DIESEL UNITS**
75, 90, 180, 240 HP F. M. Engines.
110 HP Ingersoll Rand Engine.
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275 KVA Fairbanks 3/60/2200.
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3'x8" & 5'x22" HARDINGE CON. Dry Ball Mill.
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4x8, 8x6 & 10x9 Straight Ball Mills.
4x16, 5x18 & 5x22 Tube Mills & 6'x22'.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 3x10 & 5x12 ROD MILLS.
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**STEEL STORAGE TANKS**
10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.
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116 Ton Blaw Knox 2 Compt.
**400 BARREL CEMENT BIN**
400 Barrel Butler Portable Steel Cement Bin with Fuller automatic batcher, push button control.
**SEPARATORS AND COLLECTORS**
Gayco 5 ft., 12 ft. and 14 ft. Separators.
Type 360 Sly 8x24,8x32 and 16x42 Dust Collectors.
**ROLL CRUSHERS**
36x60 Fairmount & 36x16 Allis Chalmers.
**JAW CRUSHERS**
10x8, 13x7½, 14x7, 15x9, 15x16, 16x9,16x12,16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12,30x15,30x13, 36x15, 36x30, 36x18, 36x14, 36x9,36x6,36x10,36x24, 42x9, 48x42, 48x36, 60x42, 84x66, 36x16, 9x36.
**CONE & GYRATORY CRUSHERS**
42 In. McCully Mammoth Gyratory.
5 No. 19, 25, 37 & 49 Kennedy.
18 in.,24 in.,30 in.,36 in.and 48 in.Symons Disc.
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8 in. Traylor T. Gyratory.
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10 Inch Austin Model 105.
10 & 13 Inch Superior McCullys.
**SYNCHRONOUS MOTOR GENERATORS**
100 K.W. RIDGWAY 3/60/2200-250-275 volt, 1200 rpm.
150 K.W. GEN. ELEC. 3/60/2200-250-275 v., 1200 rpm.
200 K.W.RIDGWAY 3/60/2200-250-275v.,900 rpm.
**SLIP RING MOTORS**
52 H. P. GEN ELEC. 3/60/440 v., 1200 rpm.
(3) 100 H.P.GEN ELEC3/60/440v.,900-1200 rpm.
**CONVEYOR PARTS**
**BELT:** 1000 Ft.60 In.,700 Ft.40 In.,600 Ft.36 In., 800 Ft.30 In.,1642 Ft.24 In.,517 Ft.20 In., 297 Ft.18 In., 500 Ft.16 In.,900 Ft.14 In.
**IDLERS:** 54 In.,42 In.,36 In.,30 In.,24 In.,20 In.,18 In.,16 In. & 14 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft.24 In.,90 In.& 36 In. Sections.
**ROTARY DRYERS AND KILNS**
36 In.x20 Ft., 3 Ft.x30 Ft., 4 Ft.x30 Ft., 54 In. x 30 Ft.,42 In.x24 Ft.,5 Ft.x30 Ft.,5 Ft.x16 Ft.,5 Ft.x60 Ft., 6 Ft.x60 Ft.,6 Ft.x20 Ft., 6 Ft.x70 Ft.
**RUBBER HOSE**
Air ¾ to 1½ in., Water ¾ to 10 in.
**STEEL DERRICKS**
**GUY:** 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
**STIFF LEG:** 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom,25 Ton 100 Ft.Boom,75 Ton 135 Ft.Boom.
**LOCOMOTIVES**
**GASOLINE:** 3 Ton,5 Ton,8 Ton,12,14,and 30 Ton.
**STEAM:** 9 Ton,20 Ton,40 Ton,60 Ton & 80 Ton.
**ELECTRIC:** 2 Ton, 5 Ton, 8 Ton, 40 Ton.
**SCREENS**
**VIBRATING:** 2x4, 3x5, 12x8, 2x8, 3x5, 4x3, 4x8, 4x10, 48x72 & 4x12, 1, 2 & 3 Deck.
HUMMER, ROTEX, NIAGARA & ROBINS.
**REVOLVING:** 3x12, 3x16, 3¼x18, 3x24, 4x16,4x20, 4x22, 4x24, 5x30, 5x20, 6x20.

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250 H.P. Al-Ch. slipring 595 RPM
200 H.P. Al-Ch. sq. cage 1170 RPM
200 H.P. Al-Ch. sq. cage 1760 RPM
200 H.P. Cr. Wh. sq. cage 720 RPM
150 H.P. Gen. Elec. slipring 720 RPM
150 H.P. Al-Ch. sq. cage 1760 RPM
150 H.P. Al-Ch. sq. cage 1170 RPM
100 H.P. Gen. Elec. sq. cage 1760 RPM
100 H.P. Gen. Elec. slipring 720 RPM

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3 Ft. or 4 Ft. Cone Crusher
24 x 36 or 36 x 42 Jaw Crusher
(3) 120 to 285 Ft. Belt Conveyors
¾ to 1¼ Yd. Gas or Elec. Shovel
(2) Vibrating Screens
100 to 200 H.P. Diesel Engine

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**DO YOU HAVE NEW EQUIPMENT OR MATERIALS FOR SALE?**

Missouri Corporation established for several years located in Central Missouri desires to represent reliable equipment and material manufacturers in the sale of their products in the state of Missouri, either on a commission or retainer fee basis. In competitive fields only one manufacturer will be represented. Corporation has favorable contacts throughout the state for heavy equipment and building materials. If you desire this type of sales service write giving full information regarding your product. Address Box 917, care of Rock Products, 205 W. Wacker Drive, Chicago, Ill.

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WANTED — SALES ENGINEER FAmiliar with crushing and screening phase of the Road Machinery and Allied Industries. Prefer man with technical education and training but this is not absolutely essential. Desire man who can make sales sketches and assist in preparation of sales proposals, leading eventually to sales correspondence and special field sales work. A good opportunity for one who has initiative and ambition along sales engineering lines. DIAMOND IRON WORKS, INC., AND MAHR MANUFACTURING CO. DIV., Minneapolis, Minn.

WANTED: MAN BETWEEN AGES thirty-five and forty-five who knows cement plant operations from start to finish, particularly kiln burning, lining and maintenance. Must have had experience handling men. We want a man who can develop to qualify as plant assistant superintendent. Middle west location. Application must be complete in every respect, stating age, present location, entire experience, references. Address Box 921, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

## Positions Wanted

AVAILABLE—SALESMANAGER, WITH a thorough knowledge of Manufacture and Sales of Lime and Limestone Products; Have sold to the Agricultural, Chemical, Industrial, and Building trade in major markets; Capable of increasing your business in present markets, as well as selling and promoting your products in new markets; Would also be interested in position of Plant managing and handling sales of small plant; Plant location immaterial. Address Box 916, care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

POSITION WANTED — SAND & Gravel Company as Production Mgr. or Supt. Mechanical & Civil Engineer. 20 year experience, Design, Construction & Operation. River or Land plants. Best reference. Address Box 919, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

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**We are in the market for and would like to receive prices and literature on the items checked below:**

....Admixtures
....Aerial Tramways
....Aggregates (Special)
....Agitators
....Air Compressors
....Air Separators
....Architectural Trimstone Molds
....Ash Receptacle Molds
....Ash & Refuse Handling Equipment
....Asphalt Mixing Plants
....Backdiggers
....Backfillers
....Bags
....Bagging Machines
....Balls (Grinding)
....Barges
....Batchers (Weighing)
....Bearings
....Belting (Conveyor & Elevator)
....Bins (Storage)
....Blasting Supplies
....Block Machines, Building
....Boats
....Brick Machines & Molds
....Buckets
....Building Tile Machines
....Bulk Cement Batching Plants
....Bulk Cement Storage Plants
....Bulldozers
....Bullscrapers
....Burial Vault Forms
....Calcining Equipment
....Calcium Chloride
....Cars (Industrial)
....Catch Basin Block Machines
....Cement Plants
....Cement Colors
....Cement Process
....Central Mixing Plants (Concrete)
....Chimney Block Machines & Molds
....Clarifiers
....Classifiers
....Coal Pulverizing Equipment
....Concentrators
....Concrete Mixers
....Concrete Paints & Coatings
....Concrete Waterproofing & Dampproofing
....Conveyors
....Conveyor Idlers and Rolls
....Coolers
....Corn Crib Block and Tile Machines
....Correcting Basins
....Cranes (Crawler & Locomotive)
....Crushers
....Crushing & Screening Plants (Portable)
....Culvert Pipe Machines & Molds (Concrete)
....Curing Equipment
....Curb Forms (Concrete)
....Dedusters
....Dehydrators
....Derricks
....Dewatering Equipment
....Dippers & Teeth
....Disintegrators
....Dragline Cableway Excavators
....Drain Tile Machines
....Dredges
....Dredge Pumps
....Drills (Rock)
....Drill Bits
....Drill Sharpening Machines
....Drill Steel
....Dryers
....Dust Collecting Systems
....Dust Precipitators
....Dust Recovery Plants
....Dynamite
....Electric Motors
....Electrostatic Separators
....Elevators
....Engineering Service (Consulting & Designing)
....Engines (Diesel, Gasoline, Steam)
....Feeders
....Fence Post Molds & Machines (Concrete)
....Floor Tile Machines (Concrete)
....Garbage Receptacle Molds (Concrete)
....Garden Furniture Molds (Concrete)
....Generators & Motor Generator Sets
....Greenhouse Bench Forms (Concrete)
....Guns (Hydraulic)
....Gutter Block Machines (Concrete)
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....Hoppers
....Hose
....Hydrators (Lime)
....Joist & Slab Machines (Concrete)
....Kilns (Rotary, Shaft, Vertical)
....Laboratory Apparatus
....Laundry Tub Molds (Concrete)
....Light Post & Standard Forms
....Lime (Hydrated)
....Lime Handling Equipment
....Lime Plants
....Lime Putty Plants
....Loaders
....Locomotives
....Mills (Ball, Compartment, Emery, Hammer, Rod, Roll, Tube)
....Mortar Mixers
....Pallets (Steel, Wood)
....Pans, Grinding (Wet & Dry)
....Perforated Metal
....Pipe Molds and Machines (Concrete)
....Pipe
....Plaster Mixers
....Pontoons
....Pulverizers
....Pumps (Pulverized Material)
....Railway Equipment
....Rectifiers
....Recuperators
....Refractories
....Rewashers (Screw)
....Rock Wool Cupolas
....Roofing Tile Machines
....Sand Drags
....Sand & Gravel Plants
....Sand Lime Brick Machinery
....Sand Settling Tanks
....Scales
....Scrapers (Power Drag)
....Screens (Revolving, Vibrating, Etc.)
....Seal Rings
....Septic Tank Molds (Concrete)
....Sewer Pipe Machines (Concrete)
....Shale Planers
....Shovels (Power)
....Sidewalk Forms
....Sill Forms (Concrete)
....Silos (Storage)
....Silo Stave Machines
....Slakers (Rotary)
....Slurry Mixers
....Slurry Pumps
....Slurry Separators
....Slurry Thickeners
....Step Forms (Concrete)
....Tampers (Hand & Power)
....Tanks (Storage)
....Tractors
....Trucks (Agitator)
....Trucks (Dump)
....Trucks (Industrial)
....Trucks (Mixer Body)
....Unloaders
....Unloaders (Boat)
....Unloaders (Box Car)
....Wagons (Dump)
....Wall Forms & Machines (Concrete)
....Washers (Sand, Gravel & Stone)
....Welding & Cutting Equipment
....Well Curbing Machine & Molds (Concrete)
....Wire Cloth
....Wire (Copper, Iron & Steel)
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*Firm Name* _____
*Individual* _____ *Title* _____
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*City* _____ *State* _____

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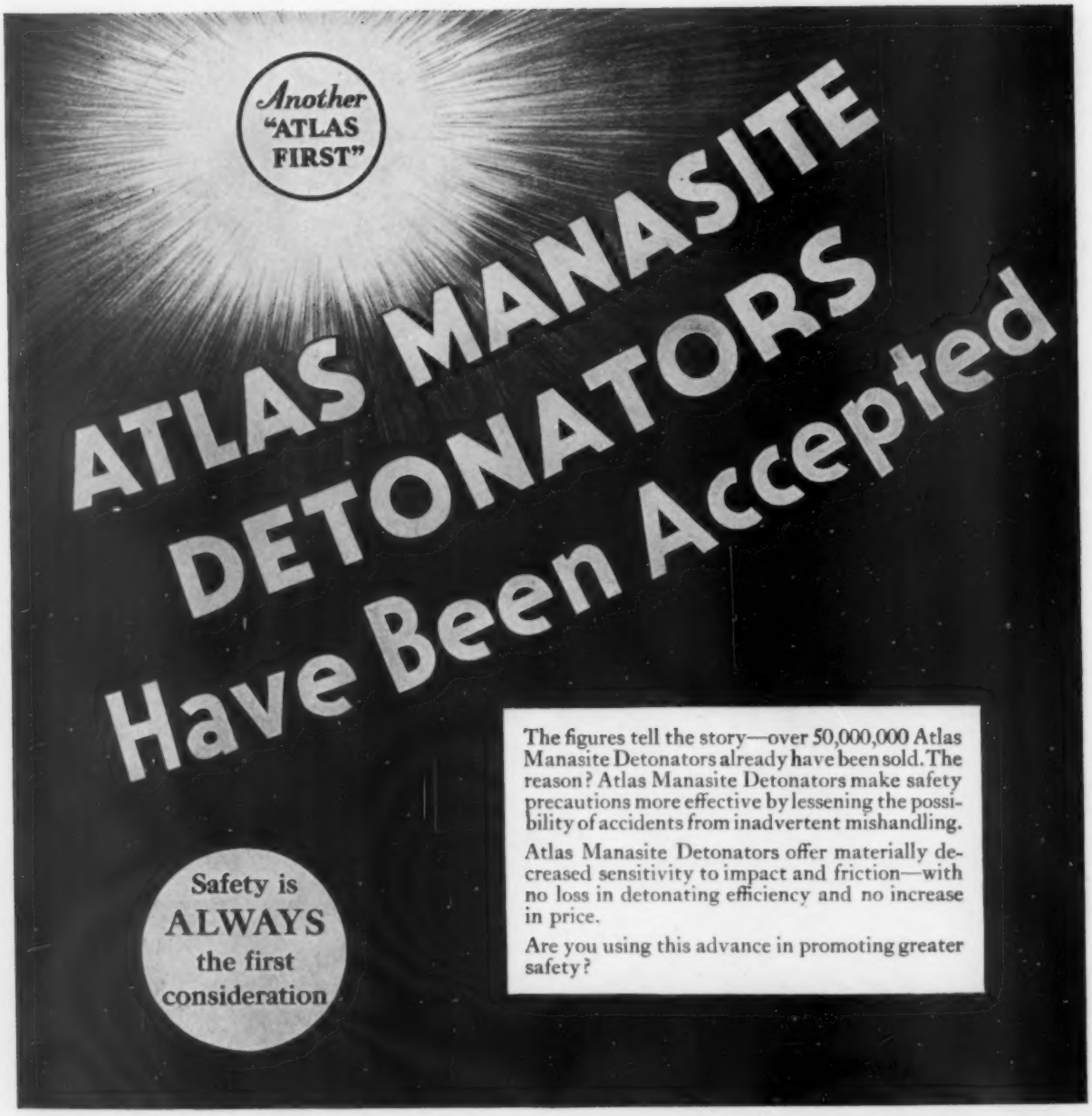


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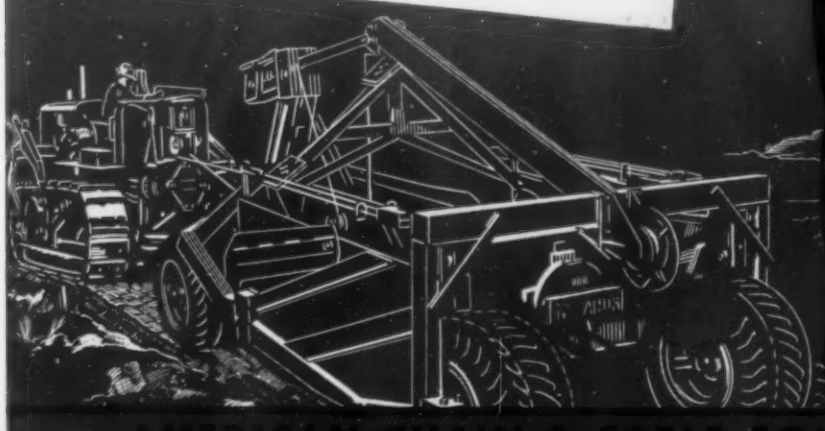

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